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Report of the Chief of the Forest Service, 1963

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United States Department of Agriculture

U.S. DEPARTMENT OF AGRICULTURE,
FOREST SERVICE,
Washington, D.C., May 1, 1964.

HON. ORVILLE L. FREEMAN,
Secretary of Agriculture.

DEAR MR. SECRETARY:

The Nation's forest resources are playing a large role in the Nation's prosperity and well-being. With this firm conviction, I take pleasure in submitting to you this annual report of Forest Service activities in 1963.

It was a year of progress for forestry in general and for Forest Service programs. There are some areas that need improvement which we are working on, but overall we are moving ahead.

In all of our work—National Forest Management, Research, and Cooperative Forestry—we are placing new emphasis on how forest resources can make larger contributions to local communities. We are renewing our efforts to make sure that one-third of our Nation's commercial forest land in farm ownerships becomes full-producing units of our family farms.

In the Department's Rural Areas Development program, and now in the war on poverty, we believe forests can play an even larger role. This we recognize as a great challenge to forestry—a challenge we welcome with confidence.

Sincerely yours,

Edward P. Cliff

EDWARD P. CLIFF,
Chief, Forest Service.

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This report covers calendar year activities unless otherwise identified. Where records are on a fiscal year basis, they are so reported. Mention of commercial companies, products, or services is solely for necessary historical identification and implies no endorsement.

The Forest Service, U.S. Department of Agriculture, is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

Issued September 1964

Report of the Chief of the Forest Service, 1963

Introduction—Highlights

This is a report about space—the space under our feet, the space here on earth, and particularly that part of it that grows or could grow valuable forests.

Today vast effort and attention go into outer space, to rockets, satellites, and potential trips to the moon. The challenge out there is one we can't ignore. Yet the challenge of our earth space is greater—and one we dare not ignore.

No space vehicles are being launched from those countries where trees, soils, and waters were allowed to disappear.

Regardless of advances into *outer* space, man will still depend on the *inner* space here on earth for his food, clothing, shelter, his general prosperity, and the very air he breathes. And further than that, our continued explorations into the universe depend on how well we continue to treat our earth-space resources. They are our foundations, our life and our wealth; they are the real launching pad for all the adventures into the universe of the stars.

As Americans we must never forget this. We must launch a greater movement to develop natural resources, that our foundations may remain solid, that we may meet the challenge of outer space and all others, that our Nation may grow in peace and prosperity.

Both challenge and progress marked the nationwide forestry scene in 1963.

Impressive advances were evident in the three major areas of Forest Service responsibility: (1) Management of the National Forests and National Grasslands, (2) forestry research, and (3) cooperative work with States and private forest-land owners.

Forest Service accomplishments for the year included these:

Another Record Timber Harvest.—From the National Forests in 1963 came 10 billion board feet of timber—about one-fourth of all saw and veneer logs harvested in the United States. This surpassed the previous record set in 1960 by 600 million board feet, and exceeded last year's cut by 1 billion board feet.

Receipts From Timber Sales totaled $117,400,000—up more than $11 million from 1962.

Cash Receipts Up $12 Million.—Receipts from all National Forest resources—timber, grazing fees, and other land uses—amounted to $124,511,000.

Record National Forest Planting.—As part of the Forest Service's continuing policy to assure a sustained yield of timber, 120,000,000 trees were planted on 221,000 acres of National Forest land during the year—an alltime record. This planting accomplishment exceeded the previous high achieved in 1936 under the massive CCC programs.

Over All: Another Billion Trees Planted.—For the seventh consecutive year more than a billion trees were planted on all lands. For 1963, it was 1,327,000 acres planted and seeded (about 1 billion little trees), compared with the previous year's planting of 1.4 million acres. About 80 percent of this planting was done on State and private lands, the remainder on Federal lands.

Recreation Visits: 122 Million.—The great scenic wonders and the natural forest environment continued to attract more of the American people to the National Forests. Recreation visits moved up to 122.6 million for 1963, an increase of 9 million visits over the past year.

Forestry Research continued to pave the way for forestry progress. Among many interesting research developments were wooden nosecones for missiles, a new industry from southern pine, and a device for "seeing" forest fires through dense smoke and haze.

Wood Is Best for Nosecones.—After extensive research, the nosecone of the Polaris missile is now being made of plies of spruce veneer glued together to form a double-curved plywood. This still miraculous wood, man's oldest raw material, proved better for nosecones than two of the more modern metals.

Plywood—New Use for Southern Pine.—An important new segment of the southern timber industry is growing out of Forest Service research on plywood manufacture. Many problems had prevented manufacture of construction-grade plywood from the smaller, second-growth southern pines. Research solved these technical problems and the first plywood plant opened in the South last year. Other plants are now under construc-

tion or have been announced. These will add new jobs and new economic growth to the South's growing timber industry.

The Camera That Sees Through Smoke.—Detecting and scouting forest fires hidden by haze and smoke is now possible as a result of research with infrared sensing photographic equipment. The device enables an aerial observer to "see" through a blanket of haze to determine presence of a small fire or to map the boundaries and spread of a large one. This looks like another significant advance in controlling the forest fire menace.

The Accelerated Public Works program on the National Forests, and to a lesser extent in State and private cooperative work, put many unemployed men to work during the year. As a result, many low-income communities were benefited, the forest resources were improved for long-term benefits, and Forest Service regular work programs received a boost forward.

Rural Areas Development.—Under the Department's Rural Areas Development program (RAD), the Forest Service moved on many fronts to make forest resources contribute wherever possible to the economic life of communities. In all areas of Forest Service work—National Forests, cooperative work, and research—attention was being concentrated on how forest resources could make new economic contributions to underdeveloped areas.

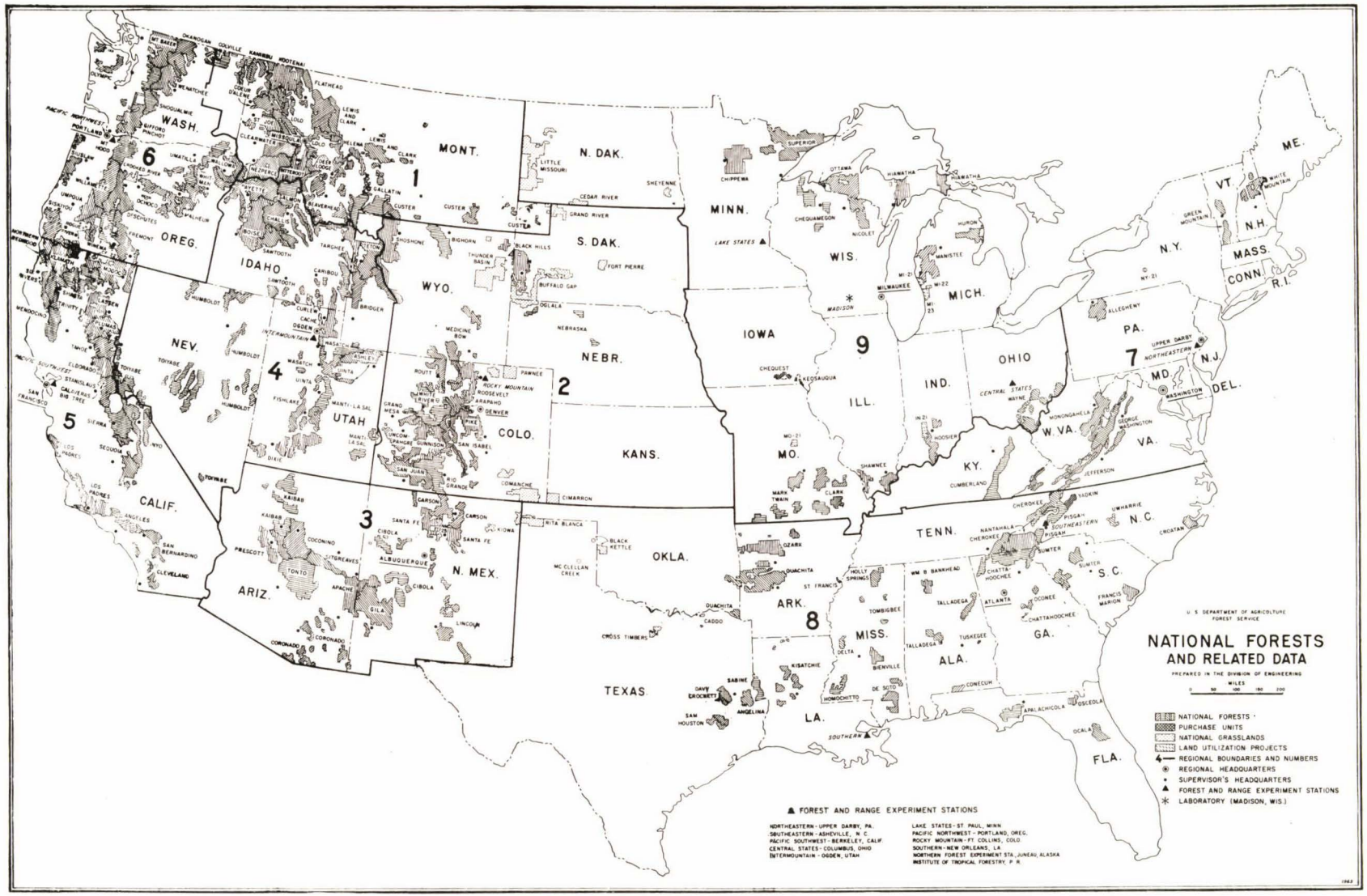
Multiple Use and Private Land.—Greater attention is being focused on the needs for practicing multiple use management on State and private lands. The demands for recreation, wildlife, special products, and other uses on these lands are increasing at a rapid pace. The landowners' response to this challenge is very encouraging. Continued help through technical assistance and training will help boost these important uses of forest land and provide opportunities for increased profits to the owners.

Look to the Future: The Pinchot Institute.—"If we can continue and expand the programs we have begun—if all of us at every level can meet our responsibilities—if we can gain new insight and foresight from the Pinchot Institute and similar centers of learning—then we can write for our land a record of accomplishment and high purpose unparalleled in the history of the world."

So spoke the late President John F. Kennedy September 24, 1963, as he dedicated the Pinchot Institute for Conservation Studies at Milford, Pa.

The Institute is centered at Grey Towers, the family home of Gifford Pinchot, famed conservationist and first Chief of the Forest Service. This imposing 40-room mansion and 100 acres of grounds were donated to the Federal Government by the Pinchot family.

Operated jointly by the Forest Service and The Conservation Foundation, the Institute will be a conference and study center. Its purpose is to bring to the American people, through conservation studies and educational materials, a "greater knowledge of the land and its uses."


NATIONAL FORESTS AND RELATED DATA
U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PREPARED IN THE DIVISION OF ENGINEERING
MILES
NATIONAL FORESTS
PURCHASE UNITS
NATIONAL GRASSLANDS
LAND UTILIZATION PROJECTS
REGIONAL BOUNDARIES AND NUMBERS
REGIONAL HEADQUARTERS
SUPERVISOR'S HEADQUARTERS
FOREST AND RANGE EXPERIMENT STATIONS
LABORATORY (MADISON, WIS.)
FOREST AND RANGE EXPERIMENT STATIONS
NORTHEASTERN - UPPER DARBY, PA.
SOUTHEASTERN - ASHEVILLE, N. C.
PACIFIC SOUTHWEST - BERKELEY, CALIF.
CENTRAL STATES - COLUMBUS, OHIO
INTERMOUNTAIN - OGDEN, UTAH
LAKE STATES - ST. PAUL, MINN.
PACIFIC NORTHWEST - PORTLAND, OREG.
ROCKY MOUNTAIN - FT. COLLINS, COLO.
SOUTHERN - NEW ORLEANS, LA.
NORTHERN FOREST EXPERIMENT STA., JUNEAU, ALASKA
INSTITUTE OF TROPICAL FORESTRY, P. R.
1963

THE NATIONAL FOREST SYSTEM. The Forest Service is responsible for managing, developing, and protecting 186 million acres of land and its resources in the National Forest System. This includes 154 National Forests in 39 States and Puerto Rico, containing 182 million acres; 3.8 million acres of National Grasslands; and 160,000 acres of Land Utilization Projects. Under multiple use and sustained yield, these lands are administered for their five basic resources: Outdoor recreation, range, timber, watershed, and wildlife and fish purposes.

National Forest Management and Protection

Several years ago the American Thread Company picked Sevier community in the mountains of North Carolina for the location of a new finishing mill. Into plant and equipment went $9.5 million, providing a greatly enlarged tax base for rural MacDowell County. Today the firm employs 850 people—many of them part-time farmers. The payroll is nearly $3 million a year.

An official of the company gave the reason for locating a big plant in that mountain county. He put it in one simple sentence: "Because of the exceptional quality and volume of available water."

The plant uses about 2 million gallons daily from Armstrong Creek, a stream flowing directly out of the protected and managed watershed of the nearby Pisgah National Forest.

Literally, water has revived that county. Without it there would be no finishing mill at Sevier—nor would there be scores of new homes and higher living standards for many people.

This is just one National Forest—and only one of the numerous benefits—that sustain and enrich communities near National Forests.

Plans and Goals

Forest Service policy and work plans are aimed at sustained yields of wood, water, forage, wildlife, and outdoor recreation resources. The job is imperative because of ever-increasing demands by those who use and depend on the National Forests and National Grasslands. To meet these demands and to fulfill its responsibilities, the *Development Program for the National Forests* was started in 1961. This long-range program spells out work needed to provide for anticipated demands on the resources by 1972.

The second year of progress under the Development Program saw many major accomplishments and not a few new records. Yet all progress must be measured against established goals, and these call for still greater effort. Overall progress for fiscal years 1963 and 1964 will be 93 percent of scheduled work. Many accomplishments were due to the Accelerated Public Works program; therefore, progress is most nearly on schedule in those counties where the APW program was authorized. In most other areas the Development Program lags further behind its goals.

APW—Help Where Help Was Needed

This was the year of the Accelerated Public Works program, through which more than 9,000 unemployed men from depressed areas found work on 85 National Forests in 35 States and Puerto Rico. Not only were badly needed jobs provided, but a major investment was made in the administration of renewable natural resources, providing a sound base for permanent improvement of the areas designated under the program.

National Forest APW projects began when funds became available on October 26, 1962, and ended on January 31, 1964, except for much contract work which continued through the first half of 1964. Thus, most APW accomplishments and much employment took place during the period covered by this report. Without this work, the following pages would show less encouraging figures.

APW projects improved virtually every resource and strengthened all protection and development activities. They added thousands of new camp and picnic units and many recreation trails, overlooks, and other facilities. New roads were built, timber stands improved, rangeland revegetated, erosion checked, trees planted, and buildings repaired or constructed.

For the entire program the Forest Service received allocations totaling $60.5 million, of which $2.1 million were allocated to State foresters for grants-in-aid projects. Through December 31, 1963, APW work on National Forests had provided roughly 69,000 man-months of employment. Improvements to natural resources and strengthened administration will yield benefits in the years ahead greatly exceeding the cost of the original investment.

The Accelerated Public Works program was responsible for the following major improvements in the National Forest System:

PROJECTS (FISCAL YEARS 1963 AND 1964)

Camp and picnic area construction	6,967	family units
Other recreation sites constructed	608	sites
Reforestation	17,500	acres
Timber stand improvement and release	135,000	acres
Wildlife habitat improvement	18,729	acres
Wildlife water developments	986	
Fishing stream improvement	115	miles
Fishing lake improvement	998	acres
Range revegetation	3,022	acres
Range fence construction	1,057	miles
Range water developments	328	
Erosion control	35,953	acres
Firebreak construction	2,210	miles
Fuel cover modification	3,573	acres
Structural improvements:		
Dwellings, barracks, and cabins	286	
Offices, service and storage buildings	543	
Fire lookouts	69	
Research facilities	18	
Roads constructed or improved	3,172	miles
Trails constructed or improved	1,309	miles

On all accounts APW stands as an important factor in the accomplishments for 1963.

Multiple Use Plans

Multiple use management, as directed by the Multiple Use-Sustained Yield law, requires firm planning in these days of intense and often competing demands for forest resources. For this reason the Multiple Use Planning program was started several years ago to provide more effective planning and coordination, which would permit easier and more practical application of the law. This program was stepped up considerably during 1963.

The planning procedure provides for a thorough analysis of available resources on a described area of land in the interest of determining the combination of uses that will best serve the needs of the people. Analysis is simplified by the use of a zoning or area-of-land technique, which clarifies the relative importance of different resources in different areas and makes coordination decisions more effective. In addition to analyzing resources and coordinating their use, multiple use plans specify periods within which necessary actions must be taken. The development of multiple use planning along these lines has made the current planning program an effective and practical system for managing the National Forests according to the directives of the Multiple Use-Sustained Yield law.

TIMBER MANAGEMENT

Management of National Forest timber resources once again showed remarkable progress. New records were set in reforestation and in timber harvested and sold. Strong progress was also evident in the development of nurseries, seed production area, timber inventories, and long-range management plans. In every respect 1963 was a good year in the management of National Forest timber.

Timber Inventories and Plans

Timber inventories are now on a firm 10-year schedule. The preparation and approval of long-range timber management plans are also on schedule in nine of the ten Forest Service Regions. During 1963 new plans or major plan revisions were approved for 33 working circles. These covered 13,681,000 acres of commercial forest land available for timber harvest, which is a little more than one-seventh of the total nonreserved commercial forest land in the National Forests. The allowable annual cut established in the new plans was 2.1 billion (2,089,900,000) board feet. On 11 of the 33 working circles the industrial demand for cordwood (principally pulpwood) necessitated the regulation of the cordwood cut, and the allowable annual cordwood cut was set at 22,850,000 cubic feet.

Reforestation and Stand Improvement

Major 1963 reforestation and stand improvement accomplishments are indicated in the table that follows.

Type of treatment	Financed from—			Total
	Forest land management appropriation	Deposits by timber purchasers [1]	APW [2] appropriation	
	Acres	*Acres*	*Acres*	*Acres*
Planted	82,942	87,609	10,541	181,092
Seeded	20,317	19,007	778	40,102
Regeneration release	25,339	23,585	4,087	53,011
Release and weeding	128,079	185,395	62,747	376,221
Thinning	68,950	49,760	26,341	145,051
Pruning	3,812	9,767	9,598	23,177

[1] Deposits by timber purchasers under the Knutson-Vandenberg Act of June 9, 1930 (16 U.S.C. 576b).
[2] Accelerated Public Works program.

The 221,194 acres planted and seeded is the largest area ever reforested by artificial means in any single year on the National Forests of the continental United States. The previous high was 219,185 acres in 1936 under the CCC and other conservation programs.

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Other 1963 reforestation accomplishments include 124,327 acres of advance ground preparation on land to be reforested in fiscal year 1964.

Progress continued on development of seed production areas, seed orchards, and production of hybrids. There are now 103 seed production areas totaling 10,069 acres and 28 seed orchards totaling 1,763 acres in process of development on the National Forests.

Major development work has been completed at all of the new nurseries, except the Humboldt Nursery located near Eureka in the north coastal region of California. Continued progress also was made in the expansion and modernization of the older nurseries.

Various land improvement measures on more than a half million acres increased the growth and improved the quality of young timber stands. Inventories to determine areas and location of stands in need of release and thinning are underway in all Forest Service Regions.

10 Billion Feet Harvested

A record high volume of 10.0 billion board feet of timber was harvested from the National Forests during fiscal year 1963, exceeding the previous high volume harvested in fiscal year 1960 by 600 million board feet. The Treasury received $117.4 million in receipts from the timber harvest; $11.2 million more than in 1962. Included in the volume harvested were 403 million board feet of the more than 2 billion feet of timber blown down and damaged in the October 1962 and subsequent windstorms in the Pacific Northwest. Salvage efforts are continuing at a rapid rate with the Forest Service, Bureau of Land Management, State, and private timber owners cooperating in concerted efforts to bring the huge salvage project to a successful conclusion. Nearly half of the storm-damaged timber on the National Forests had been salvaged by December 31, 1963.

Improved market conditions and prospects of further improvement stimulated a generally strong demand for timber. A total of 12.2 billion board feet of National Forest timber was sold compared to the 10.3 billion board feet sold in 1962. The volume sold in 1963 included more than 1.3 billion board feet of storm-damaged timber.

Progress in harvesting the allowable annual cut from the National Forests is shown below by selected years:

	Sustained-yield allowable annual cut [1] *(Billion board feet)*	*Actual cut (Billion board feet)*	*Percent of allowable cut harvested*
Fiscal year:			
1958	9. 9	6. 4	65
1960	10. 6	9. 4	89
1962	11. 2	9. 0	80
1963	12. 6	10. 0	79

[1] As of January 1 preceding the beginning of the filsca year. This is the basis for program planning and financing.

RANGE MANAGEMENT

Livestock grazing is a long-established use of the Federal lands administered by the Forest Service, originating from the use of the western range by farmers and ranchers before National Forests existed as such. Over the years an orderly system of administration by the Forest Service has evolved, under which the available grazing has been allocated to qualified applicants under paid permit. On National Forest lands in the South acquired under the Weeks law of 1911, progress is being made toward broad-scale establishment of similar procedures where open range grazing has been the custom. On nearly 4 million acres of National Grasslands, administered by the Forest Service, grazing continues as a highly important land use.

Grazing of livestock will continue as an integral part of the Forest Service multiple use program; however, the long-term stability of this use depends upon the improvement and maintenance of forage resources on areas suitable for livestock grazing, and on the proper correlation of grazing with other uses. Range management plans are correlated with multiple use management plans, and adhere to the general modifications, guides, and decisions necessary to protect the value of other forest uses.

Grazing: Vital Community Resource

Range livestock producers grazed 1.3 million head of cattle and horses and 2.3 million sheep and goats under paid permits on Federal lands administered by the Forest Service in calendar year 1963. In addition, an estimated 2.4 million calves and lambs were grazed without charge. This grazing use enabled more than 19,000 ranchers and farmers to round out their yearlong livestock operations, and contributed to production on an estimated 88 million acres of interrelated private lands.

For the privilege of grazing livestock on the National Forests, permittees paid from 10 cents to over $1.90 per animal month for cattle and from 3 cents to 12 cents for sheep. Total receipts were $3,385,978.

On National Grasslands and Land Utilization Projects, grazing fees ranged from 57 cents to $1.48 for cattle; sheep fees were one-fifth of those for cattle. Grazing receipts from the 2,692 permittees using these lands totaled $642,457. Total receipts for livestock grazing on all Forest Service-administered lands were $4,028,433. Of this total, 25 percent or $1,007,108 was paid to the States for the benefit of counties in which the rangelands were located.

With the increase in recreation use on the National Forests and National Grasslands, the grazing of horses and other pack stock by recreationists is becoming increasingly important. In 1963 the Forest Service issued special use permits for some 650 packer stations from which commercial

packers conduct trips to back-country forest areas. In addition, many private parties of fishermen, hunters, and other recreationists use pack animals to visit more remote areas on the National Forests.

Cooperative Ranch Evaluations

Three new economic evaluations of ranching operations using Federal grazing lands were initiated in 1963 in cooperation with the Bureau of Land Management. These cooperative projects are being conducted for the Forest Service and Bureau of Land Management by State universities in the West. The studies are designed to provide much needed information on the value of public land grazing use to western livestock producers.

Range Allotment Analysis

The Forest Service continued its program of analyzing vegetation, soils, and related information, and in bringing plans up to date on each of the more than 11,400 grazing allotments in the National Forest System. Significant progress was made in the South towards classifying forest lands in this area for livestock grazing use, and in estimating grazing capacities for assignment of livestock under paid permit. During fiscal year 1963, 693 units of analysis work were completed Service-wide, bringing this analysis job to 54 percent of completion. One unit represents the total analysis and management planning task on a single allotment. Application of the analysis findings, with the cooperation of the permittees, has resulted in improvement of management practices and better resource condition on many allotments.

Range Improvements

The Forest Service, in cooperation with grazing permittees, made substantial progress during the year towards rehabilitating deteriorated range and improving management of rangelands in general by means of revegetation, weed and rodent control, and construction of various physical improvements. These actions included:

Range revegetation and rehabilitation:	*Acres*
Undesirable plant control	110,116
Range reseeded to grass	86,933
Rodent control measures	4,591
Water-spreading measures	4,618
Total range rehabilitation	206,258

Physical improvements:
- 2,242 miles of fences
- 189 miles of stock driveways
- 1,934 water developments
- 73 corrals

Of these range improvements, 2,560 acres of revegetation, 652 miles of fence, and 174 water developments were built under the Accelerated Public Works program.

Existing improvements were maintained through cooperative grazing permittee-Forest Service efforts. Also many allotments have been placed under more intensive management through better systems of grazing use, more attention to handling livestock on the range, and other means.

WATERSHED MANAGEMENT

Water from National Forests is essential to the welfare of most people living in the West. More than half of the water used for irrigation, industry, recreation, and domestic supply in the eleven Western States originates on National Forests. In some States, the percentage is even greater. In Colorado, for instance, 90 percent of the streamflow originates on National Forests. In California, 75 percent comes from National Forests.

East of the Great Plains, National Forests make up a smaller part of the land area, and the total water yield is relatively less important. However, the generally high quality water from National Forests is in demand for municipal water supplies, recreation, and industry. Across the Nation, more than 1,100 communities, serving 17 million people, obtain their domestic water supply from National Forests.

The Forest Service gives prime consideration to watershed protection when it manages timber, grazing, wildlife, and recreation resources and constructs roads, trails, and other facilities. Soil, water, and geologic conditions often create special problems that must be anticipated and resolved with measures requiring thorough knowledge of soil behavior. During 1963 Forest Service soil scientists, hydrologists, and technicians gave analyses and advice on 300 problems of this type.

Watershed Problems

A major problem dealt with this year was created by the Columbus Day storm of 1962, which damaged timber and watersheds in Oregon and Washington. The storm itself washed tremendous amounts of debris into streams, eroding banks, hindering migration of anadromous fish, and lowering water quality. In addition, many thousands of uprooted trees left depressions in which water collected and subsequently broke loose, carrying soil and debris into already clogged channels. While the intensive timber salvage program reduced the threat of fire and insect epidemic, an intensive watershed restoration program greatly reduced the potential damage from floods and erosion.

Another major problem involves the compatibility of certain important activities such as mineral development with National Forest watershed protection. In the East, on National Forest lands acquired under the Weeks law, the problem is particularly acute where former owners still retain extensive mineral rights. A special agreement with a private operator (see page 12) was completed in 1963 whereby economically feasible methods are being sought for strip mining coal and restoring the area without permanent damage to surface resources. Where the Forest Service controls the mineral rights, watershed values are pro-

tected by provisions of lease agreements and special use permits.

Standard soil surveys were completed on more than 1.5 million acres in 1963, and reconnaissance surveys were made on 2.7 million acres to isolate problem areas in advance of road construction, timber harvest, or other resource programs. Such surveys serve as the basis for intensive planning of land management activities.

Restoring the Land

Progress was made toward restoring many acres of National Forest land which suffer from past abuse. In 1963 the treatment of sheet erosion on 18,500 acres rehabilitated watersheds totaling an estimated 100,000 acres. In addition, 19,000 acres were planted to grass, shrubs, and trees to control erosion. Excessive debris, which was causing bank erosion, was cleared from 570 miles of stream channels; 20,000 linear feet of riverbank were stabilized with gabions and other structures; over 22,000 individual gully plugs were installed on eroding gullies; and over 800 miles of abandoned road were treated to prevent erosion. First-aid watershed stabilization measures were installed on all critical areas of the 92,000 acres of National Forest land burned in 1963.

Accelerated Public Works funds available in 1963 contributed substantially to the watershed restoration accomplishment. On the Shawnee National Forest in southern Illinois, 60 percent of the needed rehabilitation work was completed on 14 watersheds. On the Chippewa National Forest in Minnesota, 1,100 feet of shoreline along Lake Winnibigoshish were stabilized. On the Coeur d'Alene National Forest in Idaho, 3,800 feet of eroding riverbank was stabilized with gabions. In the Southern Region, 1,900 acres of eroding land were treated, 40 miles of roadbank were stabilized, and 3 miles of stream channel cleared of debris with Accelerated Public Works funds.

Watershed restoration work is showing results in the watersheds previously treated. A total of 1,428 acres on the North Fork of Chalk Creek on the Fishlake National Forest in Utah has been treated by trenching and reseeding. This rehabilitated watershed yielded little or no flood water during the 1961 Chalk Creek floods and the old flood channel has healed, but the untreated South Fork remains active and produces major floods. Residents of Turnerville, Wyo., who obtain their water from Willow Creek on the Bridger National Forest, report a large reduction in the amount of sediment in their water since the rehabilitation of Willow Creek was recently completed.

Water Resource Development

Many of the country's remaining potential reservoir sites are at the headwaters of streams on the National Forests. These reservoir sites are usually developed by other agencies for flood control, hydroelectric power, irrigation, and other purposes. The construction of these reservoirs can often enhance the value of the adjacent National Forest land for recreation and wildlife. In turn, the management of the National Forest lands tributary to the reservoir will have a dominant role in prolonging the life of the reservoir and in providing maximum beneficial use.

During the year, 230 projects were studied to determine how the projects could best fit into National Forest multiple use objectives, to facilitate coordination between the construction agency and the Forest Service during construction, and to determine how National Forest management practices could be adjusted for maximum project benefit.

Water Yield Improvement

Increasing water needs in many areas call for the application of intensive scientific management, whereby various land use practices can improve the quantity, quality, and timing of water yields. Examples of such management are the Pole Mountain Project on the Medicine Bow National Forest in Wyoming, and the Lake Creek Project on the San Isabel National Forest in Colorado. Artificial manipulation of snowpack accumulation is being put into practice on an operational basis, primarily by the erection of artificial barriers above timberline and in large natural openings so as to modify drift patterns. The accumulation of snow into larger drifts prolongs the snowmelt period and thus increases midsummer streamflow while reducing the possibility of spring floods.

Thirty-nine National Forests are now staffed with watershed scientists, who analyze watersheds and prescribe management practices. These men will prescribe coordination and management for watershed protection and prevention of damage to water and soil resources from various forest uses. They will analyze conditions and establish criteria and procedures to guide technical management for the improvement of water yield.

WILDLIFE MANAGEMENT

Wildlife management on National Forests is concerned primarily with protection of the basic ingredients of wildlife habitat—soil, water, and vegetation. The relative "health" of the habitat determines to a large extent how well are maintained vigorous and abundant populations of fish, birds, and mammals.

Work towards improving wildlife habitat is done in close cooperation with the States, which are primarily responsible for the propagation and protection of fish and game, and the regulation of hunting, fishing, and other wildlife use. Cooperative efforts of all responsible agencies serve to harmonize wildlife and its environment for the benefit of sportsmen and the many others who enjoy wildlife on the National Forests.

Threatened Species

Particular attention is being given to some threatened nongame species of wildlife. During

1963 a special Kirtland's warbler management area was dedicated in the Huron National Forest in Michigan. Special management of jack pine areas will help to preserve this endangered songbird. In cooperation with the Audubon Society, the Forest Service is giving special emphasis in some parts of the country to ways and means of protecting the dwindling populations of bald eagles and ospreys.

Demands on the Resource

Increasing use of the National Forests is placing heavy demands on wildlife resources and is creating new impacts on wildlife habitat and fishing waters. Proper planning of coordination measures can prevent these impacts from having harmful effects. Such planning is a major objective of wildlife habitat management.

Habitat management, protection, and regulation under modern game management principles in the several States have maintained fish and game species at high levels commensurate with their habitats, thus assuring a regular annual crop of fish and game for harvesting by hunters and fishermen.

Use of the National Forests by sportsmen increased more than 8 percent over the previous year. More than 9.9 million visits by hunters resulted in a harvest of an estimated 665,000 big-game animals and many more small game, upland gamebirds, and waterfowl. An estimated 4.5 million big-game animals live on National Forest lands.

There were 18 million visits to the National Forests by fishermen who tried their luck in the 81,000 miles of fishing streams and more than 2 million acres of lakes and reservoirs.

Improving Wildlife Habitat

Following is a list of habitat improvements completed on National Forests and National Grasslands during the year. Some of the work was accomplished through other resource programs, with wildlife receiving direct benefits.

Wildlife food and cover improvements:	
Permanent openings	6,011 acres
Prescribed burns	29,467 acres
Seeding and planting	13,313 acres
Release of forage plants	6,464 acres
Fencing key game areas	2,667 acres
Small water developments for wildlife:	
Ponds, troughs, guzzlers, etc	901 projects
Fish stream improvements:	
Bank stabilization and barrier removal	132 miles
Stream improvement structures	65 miles
Fencing stream channels	24 miles
Lake improvements for fish:	
New lakes constructed	1,128 acres
Water level and bank stabilization	235 acres
Waterfowl lakes constructed	372 acres
Access facilities constructed with direct benefits to hunting and fishing:	
Trails	326 miles
Roads	224 miles
Parking areas	57 units
Boat ramps	35 units

OUTDOOR RECREATION

Recreation Continues To Grow

Public demand for more outdoor recreation is particularly heavy on National Forests, since these lands provide some of the best recreation opportunities in many parts of the Nation. Most National Forests are located in mountain, hill, or lake country that is rich in scenic qualities, wildlife, streams and lakes, and other attributes that make them desirable for outdoor recreation. Further, an extensive system of physical improvements permits intensive and varied recreation uses in balance with other resources. Current and anticipated demands indicate that National Forests and National Grasslands recreation resources will have to be developed rapidly, as set forth in the *Development Program for the National Forests*, if future visitors are to be accommodated without damage to the land and resources.

Nine Million More Visits

Annual figures showing total visits to National Forests and National Grasslands forcibly point out the need to keep working in order to keep pace—and in some areas to catch up. Another all-time record was set with a total of 122,582,000 visits, representing 126.5 million visitor-days of use. This was 9 million more visits than were received in 1962.

People visit National Forests for a wide range of activities: Camping, picnicking, hunting, fishing, riding, hiking, wilderness travel, berry picking, nature study, or just plain enjoyment of the outdoors. The tabulation shows the relative popularity of recreation activities and their growth since 1950.

VISITS TO NATIONAL FORESTS AND NATIONAL GRASSLANDS
(IN THOUSANDS)

Primary purpose of visit:	*1950*	*1963*
General enjoyment of forest environment	7,969	44,018
Picnicking	6,326	21,612
Fishing	4,885	18,151
Hunting	2,285	9,938
Camping	1,534	9,089
Winter sports	1,517	5,456
Swimming	902	3,536
Hiking and riding	635	2,921
Wilderness travel	91	461
Others	1,224	7,400
Total	27,368	122,582

Facilities Needed

New records in visitor use have become matter-of-course for more than 10 years, and there is urgent need to set new records in construction of facilities. Even though many activities need only roads, trails, and beautiful scenery, others such as camping, picnicking, and winter sports uses can be harmful to physical improvements if overuse is heavy and prolonged.

Fortunately 1963 showed significant progress in the program for expansion of recreation facilities,

which was begun in 1957 under Operation Outdoors and continued under the *Development Program*. During the fiscal year 8,736 new family camp and picnic units were added on 500 new sites. Of these 4,736 were built with funds regularly appropriated by Congress for this purpose and 4,000 additional units were built under the Accelerated Public Works program.

The total number of the various kinds of developed sites in service at the end of fiscal year 1963 is shown below in contrast with the figure for the preceding year. These improvements have not completely alleviated overcrowding at many sites.

	6/30/62	*6/30/63*	*Net change*
Campgrounds	4, 221	4, 607	+386
Picnic sites	1, 264	1, 371	+107
Organization camps	556	569	+13
Hotels, lodges, resorts, and other public service sites	577	576	−1
Swimming sites	196	219	+23
Boating sites	391	449	+58
Winter sports sites	189	187	−2
Observation viewpoints	242	270	+28

Better Skiing

In spite of a net reduction of two winter sports sites during 1963, the expansion or improvement of existing facilities has permitted healthy growth of winter sports on National Forests. More than 50 percent of the 187 winter sports areas on or operated in conjunction with National Forest areas were improved during the year. Thirty-one new ski lifts were added; lodging and other accommodations were built, parking areas enlarged, and better access roads developed.

Total uphill devices available as of June 30, 1963, are: Chair lifts and gondolas, 116; T-bar and platter pulls, 127; rope tows, 326. Forty-one ski jumps were in operation.

Visitor Information Service

With the steady increase in public use of the National Forests it becomes more important that the National Forest story be told on the site, where the public can see the work being done and understand most clearly how vital are its resources. The Visitor Information Service is doing this through road and trailside exhibits, signs, nature trails, personal contacts, and a growing number of visitor centers at the most heavily visited National Forest attractions.

At the beginning of 1963, visitor centers were complete and in operation at the Mendenhall Glacier in the Tongass National Forest, Alaska, and at the Missoula, Mont., Smokejumper Center. The Redfish Lake Visitor Center on the Sawtooth National Forest, Idaho, was dedicated in August. Buildings were completed for a center at Sabino Canyon, Coronado National Forest, Ariz., and for the Canoe Country center on the Superior National Forest near Ely, Minn. Exhibits will be completed before the 1964 visitor season at these two locations.

More Wilderness

During calendar year 1963, four major actions affected the National Forest Wilderness System. Two new Wild Areas, the Dome Land and Mokelumne, were established in California. The Selway-Bitterroot Primitive Area was reclassified as a Wilderness Area, and the Mount Dana-Minarets Primitive Area was reclassified as the Minarets Wilderness Area. In the Selway-Bitterroot action, a large portion (217,000 acres) of the original area was retained in primitive status and renamed the Salmon Breaks Primitive Area.

The Dome Land Wild Area covers 62,000 acres of rugged mountain country in the Sequoia National Forest. Major attractions include towering domes and spires of bare rock and the precipitous canyon of the South Fork, Kern River. Within the wild area are more than 6,000 acres of virgin forests.

The Mokelumne Wild Area includes 50,000 acres of high alpine crest zone in the Eldorado and Stanislaus National Forests.

The Selway-Bitterroot Wilderness Area was classified on January 11, 1963, and was described in the report for 1962. It is the largest single unit in the entire Wilderness System, with a total of 1,240,000 acres on the Lolo, Clearwater, Nezperce, and Bitterroot National Forests in Montana and Idaho.

The Minarets Wilderness Area includes 109,000 acres in the Inyo and Sierra National Forests in California, of which some 27,300 acres had not formerly been classed as wilderness of any type. The area is a portion of the highest mountain range in central California, within which are many unusual rock formations and glaciated basins with alpine lakes.

Within the past 5 years a total of 5 new wilderness and wild areas have been established with an aggregate area of 582,077 acres. During the same period, 7 primitive areas containing more than 2,300,000 acres were reclassified, 4 as wilderness and 3 as wild areas. A net reduction of 360,000 acres occurred as a result of reclassification actions; however, these reductions were offset by substantial acquisition of private lands within the boundaries of existing wilderness-type areas, and by increases of acreage on record as a result of land status reviews. As a result of all actions during the 5-year period, the National Forest Wilderness System showed a net increase of 538,744 acres.

As of January 1, 1964, the Forest Service had given public notice of intention to establish one new wild area and to reclassify five primitive areas aggregating over 800,000 acres.

STATUS OF NATIONAL FOREST WILDERNESS SYSTEM

Type of area:	*As of December 31, 1963* *Number of units*	*Acres*
Wilderness	17	6, 395, 036
Wild	32	1, 160, 075
Canoe	1	886, 673
Primitive	36	6, 017, 409
Total	86	14, 459, 193

SUMMARY BY STATES

NATIONAL FOREST ACREAGE IN WILDERNESS-TYPE AREAS
(Wilderness, Wild, Primitive, and Canoe Areas)

State:	*Acres, net*
Arizona	673, 926
California	1, 698, 320
Colorado	810, 362
Idaho	2, 630, 298
Minnesota	886, 673
Montana	1, 895, 335
Nevada	64, 667
New Hampshire	5, 400
New Mexico	1, 014, 085
North Carolina	7, 655
Oregon	749, 547
Utah	240, 717
Washington	1, 384, 196
Wyoming	2, 398, 012
Total	14, 459, 193

New Scenic Areas Established

By the end of 1963, there were 100 scenic-type areas established on the National Forests with a total area of 725,305 acres in 27 States. Scenic-type areas are recognized as having outstanding scenic qualities which warrant special management for public enjoyment. Such management provides for general recreation opportunities with emphasis on scenic qualities. Under the multiple use management concept, commodity uses are permitted, but are modified or restricted as necessary to protect or to enhance scenic values.

DESIGNATED SCENIC-TYPE AREAS IN NATIONAL FORESTS
(December 31, 1963)

State:	*Number of areas*	*Net acreage designated*
Alabama	1	1, 240
Alaska	3	376, 578
Arkansas	5	1, 566
California	7	43, 361
Colorado	1	5, 880
Georgia	7	2, 062
Idaho	1	94, 810
Illinois	1	983
Kentucky	2	1, 175
Louisiana	2	448
Michigan	3	413
Missouri	1	20, 239
Montana	4	36, 816
Nevada	1	28, 000
New Hampshire	6	8, 636
North Carolina	4	4, 244
Oregon	9	42, 890
Pennsylvania	2	2, 251
Tennessee	3	1, 638
Texas	4	1, 317
Utah	3	14, 360
Virginia	2	2, 843
Washington	1	420
Wyoming	1	1, 458
Total	100	725, 305

Recreation Plans Move Forward

Substantial progress has been made on the National Forest Recreation Management plan project. Preliminary or working drafts had been assembled on most National Forests by the end of fiscal year 1963. These plans contain specific schedules for the development, classification, and management of sites and areas needed to satisfy public recreation needs as projected to the years 1976 and 2000.

SPECIAL USES AND MINERALS

Lands of Many Uses

In addition to the major renewable natural resources, National Forest and National Grassland management must take into account a host of other special uses, through which the National Forest System is able to serve a wide range of commercial, community, social, and defense needs.

Special use permits have been issued for more than 100 different kinds of use, including radio and television transmission sites; rights-of-way for telephone, telegraph and power lines; pipe lines; radar sites; churches; parks; schools; landing fields; community water supplies; and many others serving both national and local needs. More than 61,000 special use permits, including those for recreation developments, are in effect on over 5 million acres.

Receipts: $1.4 Million

Many special use permits are issued for commercial operation of recreation facilities within the National Forest System. They include enterprises such as resorts, boat docks, park and picnic areas, ski tows and lifts, organization camps, and similar enterprises. Receipts from these permits amounted to $1,487,741 in fiscal year 1963.

Mineral Revenues: Nearly $3 Million

Some 5,600 permits and leases for oil, gas, coal, and other mineral utilization on acquired National Forests and National Grasslands brought in $2,802,755 in revenues during fiscal year 1963. These permits cover rents and royalties, seismographic and prospecting fees, and receipts for common variety mineral disposals (sand, clay, and gravel) on approximately 4,645,000 acres. Nonproducing leaseholds and mineral permits require an annual fee of from 25 cents to $2.00 per acre to hold the properties for future development.

Another 11,024,000 acres of land in the National Forest System was under oil, gas, coal, phosphate, or sodium lease or mineral prospecting permit under the Mineral Leasing Act of February 25, 1920, governing mineral development on lands reserved from the public domain. Receipts from such leases are not credited as Forest Service revenues, but a rough estimate of annual revenues attributable to such mineral developments in the National Forest System is $15 to $16.5 million.

Permits for other than mineral developments or recreation purposes brought an additional $421,732

into the general fund of the U.S. Treasury. Uses authorized by the Forest Service for hydroelectric power purposes added $93,079 to National Forest receipts. Total National Forest revenues from special use permits, mining leases, and power licenses amounted to $4,805,308.

Highways

The Forest Service has continued its cooperation with the States and the Bureau of Public Roads in granting of rights-of-way over the National Forests and National Grasslands for Interstate and other Federal-aid highways under the Federal Highway Act. To give better and faster service, a uniform easement was proposed to the Bureau of Public Roads for all States, with separate stipulations for local protection needs during periods of construction and reconstruction. As of June 30, 1962, there were 416 miles of Interstate highways proposed for construction in the National Forests at an estimated cost of $314,370,000.

The Forest Service has also provided for free use of available road materials needed by State highway departments in the construction and maintenance of such roads, and for long-term use of lands for highway maintenance sites when not in conflict with established principles and policies.

Progress With Surface Rights

Determination of surface rights on mineral claims within the National Forests has been moving ahead steadily since the enactment of the multiple use mining law of 1955. During 1963 the Forest Service regained the right to administer surface resources on about 6 million acres of National Forest lands covered by old mining claims. In addition to bringing about 12 billion board feet of timber under management, this progress simplifies many problems of access to National Forest lands.

Cooperative Coal Recovery Study

On the Allegheny National Forest, Pa., work has begun under a cooperative coal recovery study project begun in 1963 with the Wetmore Coal and Construction Company of Kane, Pa. The study will test and evaluate various techniques for protecting resource values of forested lands and restoring productivity during and after mining of coal by open-cut methods. The coal is privately owned, but lies beneath 60 acres of acquired National Forest land. The operation has been carefully preplanned and designed to keep the streams free from contamination, siltation, and pollution during and after the operation. The company is required to adhere to rigid Forest Service standards and specifications provided for in the study agreement.

About 12 acres have been mined so far, and about 60,000 tons of coal removed or exposed. Minor modifications have been made in the operating plan to meet actual conditions as the coal has been exposed, but no problems have been encountered that could not be satisfactorily solved.

Kaibab Oil and Gas Leases

A unit agreement providing for a single operator to explore oil and gas resources in the North Kaibab section of the Kaibab National Forest, Ariz., has been applied for. Plans are underway to drill the first well in the spring of 1964 at a site located northeast of Jacobs Lake. Further exploration and development may depend on the outcome at this site. Careful controls have been established by the Forest Service to protect all surface resources and to provide for continuous supervision of the operation.

Underground Gas Storage

The Atlantic Seaboard Corporation has applied to the Federal Power Commission for a certificate of convenience and necessity to operate the Glady gas field for underground gas storage purposes. If everything goes according to schedule, actual storage operations should start in the early summer of 1964. Atlantic's operations will be subject to regulation by the Federal Power Commission under the National Gas Act.

The storage area, located in the Monongahela National Forest, W. Va., will serve the Washington-Baltimore metropolitan area and elsewhere. Agreement to permit the subsurface storage was entered into on July 23, 1963, by Secretary of the Interior Udall and Atlantic Seaboard Corporation with the consent of the Chief, Forest Service.

The Forest Service, the U.S. Geological Survey, and representatives of the Atlantic Seaboard Corporation cooperated to work out this agreement for public-private utilization, including covenants for protection and conservation of the surface and continued use of all but a minor portion of the approximately 45,000 acres of National Forest lands. Government-owned lands are intermingled with privately owned rights, both surface and subsurface. Royalties in excess of half a million dollars have already been paid the United States in connection with this field. Approximately $554,000 more will be paid for the remaining gas reserves when the agreement becomes fully effective. An annual payment of approximately $55,500 is anticipated, with provisions for renegotiation of fees at the end of each 20-year period.

Sand, Gravel, and Other Material

Common varieties of sand, stone, gravel, pumice, pumicite, and cinders, as well as common clay and petrified wood, are subject to disposal by the Forest Service on lands under its jurisdiction. Separate laws govern the method of disposal on "public domain" and "acquired" National Forests or Grasslands. Where such materials have "distinct and special" properties for use in manufacture or the trades, they may be subject to location and entry on lands reserved from the public domain if they otherwise meet the requirements of the general mining laws. But all such materials on acquired lands must be explored or developed under permit or lease. The Forest Service is cur-

rently working on a revision of Regulation U–13 and the procedures and policies governing disposal of common varieties based on Public Laws 87–689 and 87–713, amending or supplementing earlier laws.

Outstanding Mineral Rights and Reservations

During fiscal year 1963, 247 permits were in effect for removal of privately owned minerals for 51,790 acres of land in the National Forest System. Probably an even larger acreage of such land was being utilized for like exploration and development under rights outstanding in third parties when the United States purchased the lands. Control of surface use in such cases is governed by the deed separating the mineral from the surface ownership and is subject to State laws relating to mineral exploration and development. Where removal of the mineral by stripmine methods is authorized by the deed, the United States must depend on State law in such instances to regulate removal, prevent pollution, and provide restoration measures. An estimated 630 outstanding rights are currently being operated for mineral development.

FIRE CONTROL

Fire Season Severe in South and East

The 1963 fire season on the National Forests and Grasslands was much above normal in severity in the southern and eastern regions, and normal or below normal in the western regions and in Alaska. The 127,571 acres burned during the year was 44 percent less than the 1958–62 five-year average of 227,841 acres; nevertheless, it was considerably more than the alltime low, 85,457 acres burned in 1962.

Man-Caused Fires Increase

From all causes there were 12,740 fires on National Forests and Grasslands in 1963. This is a 6-percent increase over the 5-year average, and 11 percent over the 1962 figure.

Largely because of the unusually long and severe spring and fall fire seasons in the South and East, the Forest Service undertook the most intensive fire prevention efforts in its history. Still, man-caused fires increased sharply, with 6,269 fires reported during the year. This is a 31-percent increase over the 5-year average, and 21 percent over 1962. Most of the increase was in the areas with severe fire seasons. All but one of the six western regions showed significant decreases in man-caused fires.

Downward Trend in Size of Fires

The record shows an encouraging sign—a reduction in the average size of fires on the National Forests over the past several years. Over the past 10 years fires have averaged 21.4 acres each, but in 1963 the average fire burned only 10.0 acres. This trend reflects the aggressiveness and improved techniques that are being used in combating forest fires.

More Aircraft Use

The steady increase in the use of aircraft to fight fires indicates their effectiveness in various capacities. The many types of aircraft used flew a total of 39,299 hours in 1963 on fire control work. Most aircraft use was to detect and scout fires. The entire aircraft fire suppression program was strengthened with the addition of more airtanker bases, heliports, and helispots. The well-trained and highly mobile 25-man interregional crews were used extensively in 1963 with considerable positive effect. Smokejumpers continued to handle a large share of the fires in remote areas. The cooperative smokejumper base at West Yellowstone, Mont., continued to serve with good success both Forest Service and Department of the Interior agencies.

Fatalities

Two men were killed fighting forest fires on the National Forests in 1963. A contract air tanker pilot lost his life when his plane crashed in California, and in Idaho a firefighter was killed when accidentally hit by retardant dropped from an air tanker. This is a significant improvement over 1962 when 14 men were killed in firefighting activities.

National Fire Danger Rating System

Several years ago work was started toward establishing a uniform fire danger rating system in all Forest Service Regions, to eliminate the substantial differences that existed between the various systems. Work has progressed satisfactorily on the new uniform system; its first phase will be in effect in 1964 throughout most of the United States. Thus it will be possible to predict and compare fire situations much more accurately.

International Forest Fire Control Assistance

Foreign countries continued to look to the United States for help in solving their fire control problems. Forest Service officers made a special trip to Brazil where fires in the State of Parana had burned several million acres and killed many people. Other visits were also made to Mexico, Canada, and Tobago. Fire control leaders met at a work conference in Mexico City to exchange information and weld relationships among Canada, Mexico, and the United States.

ENGINEERING

Forest Service engineers perform a wide range of jobs that give essential support to all Forest Service programs. These include construction of roads, trails, bridges, buildings, and other facilities; mapping; surveys; water developments; signs; and equipment maintenance and operation.

Roads and Trails

National Forests at the end of fiscal year 1963 were served by a transportation system consisting of 186,241 miles of forest development roads, 104,522 miles of trails, and 263 landing fields for

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airplanes. Improvements during the year consisted of construction of 858 miles of new roads and reconstruction of 1,003 miles of existing roads to higher standards necessary for more intensive and varied use. In addition, purchasers of Government timber constructed 3,464 miles and reconstructed 1,326 miles. Partial replanning of the road system and eliminating private roads not suitable for modern travel reduced the total mileage by 4,322 miles. Net gain for the year was 174 miles.

Other improvements included construction or replacement of 289 bridges, 554 miles of new or improved trails, and improvement of 22 airplane landing fields. Construction of roads replacing trails caused a net reduction of 1,104 miles in the trail system. Funds obligated for maintenance, construction, and reconstruction by the Forest Service, including APW funds, totaled $71.9 million and a further $2.1 million was obligated for road purchase.

The construction and reconstruction of 4,790 miles of roads by timber purchasers was appraised at $54.5 million, and maintenance of 17,676 miles at $5.5 million.

Vehicles for the Job

During 1963 the Forest Service owned, operated, and maintained a fleet of 11,161 motor vehicles needed to carry out its varied work in management, protection, research, and administration. Of this total more than 10,400 were light, medium, and heavy trucks and transports. There were 673 passenger vehicles in the fleet, and the remainder were tractors, graders, cranes, and other miscellaneous equipment.

During peak workload periods the Forest Service rented some 1,176 vehicles—751 units from General Services Administration and 425 from commercial sources. Special emphasis was given to coordinating the use of equipment in order to permit Forest Service vehicles to serve more people and projects; this held fleet increases to a minimum. Another action that eliminated unessential equipment and insured better maintenance was the increased capitalizing of equipment, heretofore financed by other income, into the working capital fund.

Improved Equipment

Forest Service equipment development and testing not only has greatly increased the efficiency of its operations, it has contributed to fields of work far beyond its original application. Work at the Arcadia, Calif., and Missoula, Mont., equipment development and testing centers led to a number of significant accomplishments.

Reforestation work was helped by a study of site preparation equipment, and development of an improved planting machine, better nursery equipment for transplanting, and a silvicide injector for more efficient killing of weed trees. A roller tanker trailer pulled by a tractor or four-wheel-drive vehicle has been developed to improve the efficiency of pesticide application in bark beetle control.

Development and testing were successfully completed for a heavy-duty brush-mowing machine to be used in range revegetation work. Also completed was a machine that successfully seeds browse species for wildlife management areas. Initial tests have been completed for a browse seed collecting machine that has proved four times more efficient than any other means now available.

Other equipment included trail construction machines, a self-propelled chipper, and cross-country and trail vehicles. In particular the successful completion of a gyrostabilized two-wheeled trail vehicle is expected to cut trail maintenance manpower requirements and permit powered cross-country travel.

New or improved equipment designed primarily for fire control work added to the effectiveness of Forest Service firefighters. During the year an improved disposable sleeping bag was developed. Exhaustive tests were conducted on the aluminized one-man fire shelter in an effort to determine how much protection from heat is provided and what improvements might be possible with new materials.

Air operations against fires indicate a continuing need for specialized equipment. Trial use of a special deployment bag on smokejumper parachutes provided consistently better parachute openings. Special crash helmets were developed for helicopter pilots and passengers. New helicopter accessories include a telephone line dispenser and a portable landing ramp so sling loads can be attached easily. Airdropped supplies are now better protected by low-cost fiberboard boxes with paper honeycomb cushions that reduce the amount of breakage. In addition, a buzzer device has been developed that is attached to cargo before it is dropped; the buzzer helps firefighters locate the equipment quickly and prevents its loss.

Buildings and Facilities

New construction of administrative buildings included 128 dwellings, 92 barracks, 50 lookouts, and 290 miscellaneous buildings such as offices, warehouses, messhalls, garages, and nursery buildings. Construction began on 16 major buildings which will have an estimated total cost of $2,640,000. Construction was completed on 9 major buildings. Eleven fallout shelters begun in 1962 were completed during this fiscal year. Planning and design were started on 14 major buildings with an estimated construction cost of $7,250,000.

Research and design was completed toward obtaining a better fire lookout tower structure. Among the alternative designs submitted and now under consideration are a wood tower with a stressed skin waterproof cab and a triangular tower and octagonal cab of "sandwich" panel construction.

Aerial Photography

The use of aerial photography in resource management and for mapping during calendar year 1963 reached an alltime high with an increase of approximately 15 percent over the preceding year. Contracts were awarded for 54,668 square miles of large-scale (1:12,000 to 1:15,840) photography for resource and management studies. During the same period 2,682 lineal miles of small-scale photography was procured for mapping.

Surveys and Maps

The Forest Service currently requires map coverage for 791,024 square miles of area. During fiscal year 1963 it produced planimetric maps for 44,483 square miles of National Forests, National Grasslands, and adjoining or intermingled lands; this brings planimetric map coverage available to 340,074 square miles or 43 percent of the area of interest. Source data were available for an additional 362,150 square miles.

Topographic map coverage needs are now estimated at 617,413 square miles. The Forest Service completed topographic maps for 1,208 square miles during the fiscal year, and other agencies—principally the Geological Survey—completed an additional 20,874 square miles of needed topographic maps. At the end of the fiscal year adequate coverage was available for 36 percent of the total area, and an additional 28 percent of coverage was available but at less than the required standards.

Property Lines and Corners

The rapidly increasing use of lands administered by the Forest Service and adjoining lands makes it mandatory that the Forest Service do its part in locating and preserving evidence of property lines and corners. Evidence of old original corners is disappearing at a rate of several thousand each year. This is especially true in the States originally surveyed by the rectangular system.

Field search was made for 20,852 property corners by Forest Service personnel during calendar year 1963. Evaluation of field evidence showed that of the corners needing early remonumentation only 11,575 could be remonumented by legal authority without cadastral surveys. Expensive surveys will be needed for the remaining 9,277 corners. A total of 9,836 property corners were permanently marked with standard brass-capped iron pipe and concrete posts.

A total of 762.6 miles of property lines were accurately located, marked, and posted in accordance with standard practice. An additional 1,428.3 miles of property lines were adequately marked and posted so that they can subsequently be marked according to the standards. In 73 field meetings during the year, 299 forest officers were trained in corner search, evidence evaluation, and line marking and posting.

LANDS

A continuing program of land adjustment and classification is essential to sound management of the areas administered by the Forest Service. Under this program, Federal lands that are scattered or intermingled with private property are consolidated through purchases or exchanges, boundaries are adjusted, land lines and corners are located and marked, rights-of-way are acquired, and land status records are compiled and made available to land managers.

At the close of fiscal year 1963, the Forest Service administered a total of 186.2 million acres in 44 States, Puerto Rico, and the Virgin Islands. These lands are in 154 National Forests, 19 National Grasslands, 14 National Forest purchase units, 21 experimental areas outside National Forests, and 22 land utilization projects.

Major Actions

In July 1963 the National Forest Reservation Commission approved establishment of a new 120,000-acre National Forest purchase unit in southern Illinois, linking the two existing units of the Shawnee National Forest near the confluence of the Ohio and Mississippi Rivers. The action authorized acquisition of suitable lands to form eventually a river-to-river area for outdoor recreation and other resource development.

Some 11,000 acres of public domain land in several widely scattered small parcels were transferred to National Forests of which they were a logical part. These actions (largely in the last half of 1963) reduced intermingled jurisdictions and administrative costs and will facilitate land management programs. Lands acquired by the Bureau of Reclamation at Pineview Reservoir in Utah were given National Forest status by Congress to provide for integrated resource management by the Forest Service at the reservoir and on nearby National Forest lands.

Joint studies of boundaries common to lands under jurisdiction of the Forest Service and the Bureau of Land Management were continued for purposes of recommending adjustments that are sound organizationally. An extensive area in northern Arkansas adjacent to the Ozark National Forest was studied relative to potentials for National Forest programs to assist a depressed rural economy. The project included a socio-economic study by the University of Arkansas under contract with the Forest Service.

Data on proposals for National Recreation Areas at Shasta and Trinity Lakes in California, Flaming Gorge in Utah, and at Spruce Knob and Seneca Rocks in West Virginia were developed during the year. The first two areas are at lakes constructed by the Bureau of Reclamation within the National Forests. The Spruce Knob-Seneca

Rocks area is within the Monongahela National Forest on the upper reaches of the Potomac River.

Purchases and Exchanges

During fiscal year 1963 the National Forest Reservation Commission approved the purchase for Forest Service purposes of 287 tracts involving 24,698 acres. Of these purchases 108 tracts with 16,815 acres were accepted under provisions of the Weeks law. The remaining tracts were acquired under purchase authorities affecting the Cache and Uinta National Forests in Utah and the Superior National Forest in Minnesota. An additional 433 acres in 61 tracts were bought to meet Forest Service requirements for administrative buildings and facilities, laboratory and tree nursery sites, etc.

Sixty-four land exchanges were approved. Through these the United States will receive 37,091 acres of land within National Forests or National Grassland boundaries and give in exchange 30,463 acres and 45,764,000 board feet of timber.

The changes in acreage administered by the Forest Service in fiscal year 1963 are recapitulated as follows.

	Acres
Total area administered by Forest Service (owned by United States) June 30, 1962	186,165,833
Increases:	
Purchased	12,642
Conveyed to United States in exchange	40,214
Donated to United States	69
Transferred from other Federal agencies	4,513
Reserved from Public Domain	814
Recomputations, adjustments and miscellaneous	37,373
Total	95,625
Reductions:	
Conveyed by United States in exchange	35,381
Grants, sales, reconveyances, mining patents, homesteads, etc	1,583
Transferred to other Federal agencies	13,996
Reductions—Continued	
Eliminated from National Forests and returned to Public Domain status	11
Recomputations, adjustments and miscellaneous	7,304
Total	58,275
Increases minus decreases	37,350
Total area administered by Forest Service (owned by United States) June 30, 1963	186,203,183

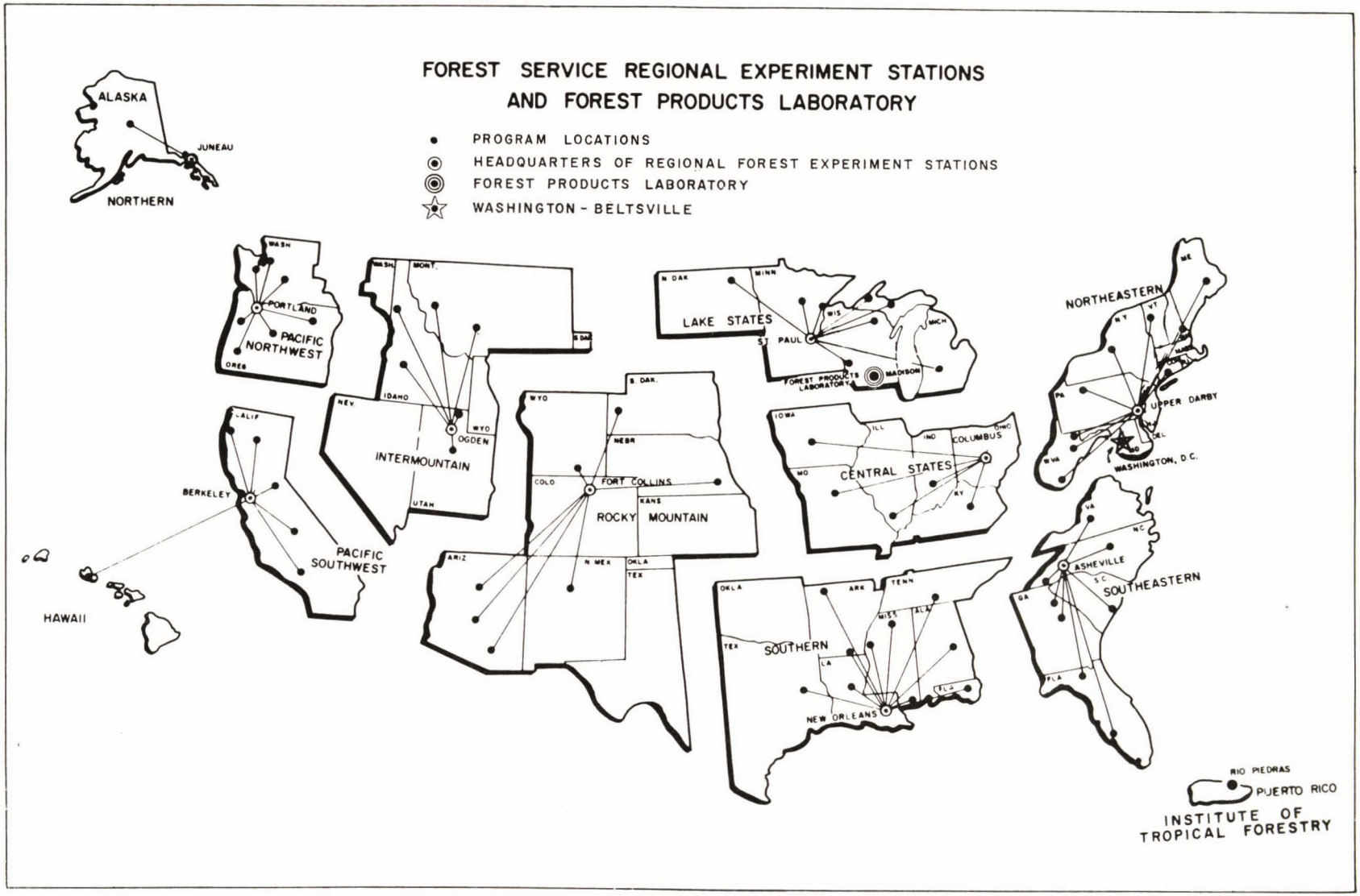
Rights-of-Way

A major step forward during 1963 was the issuance by the Secretary of Agriculture of revised regulations governing use and operation of the National Forest development road system. The regulations will help open up publicly owned areas for more intensive resource management and stronger protection activities. They also provide for cooperation with landowners where National Forest and non-Federal land are intermingled; the basis for mutually satisfying cost-sharing and use arrangements for cooperative road systems are broadened and improved to better serve cooperating landowners, resource users, and the Forest Service.

During the year, 28 cost-sharing cooperative road construction agreements were completed. This represents about 30 percent of all the active agreements currently in effect. These agreements involve 634 miles of constructed roads that have an estimated value of $5.3 million. They make accessible for management and harvesting nearly 4.5 billion board feet of National Forest timber.

A total of 951 rights-of-way were acquired during fiscal year 1963 at a cost of $555,000. This number of cases is a new high in acquiring rights-of-way for the National Forest System. During this same period, 15 condemnation actions were filed to acquire rights-of-way.

Negotiations were completed for acquiring interests in 27 private roads or road systems at a cost of nearly $2 million. These roads, totaling about 550 miles, make accessible for unrestricted use nearly 750,000 acres of National Forest lands bearing over 5 billion board feet of timber.


FOREST SERVICE REGIONAL EXPERIMENT STATIONS
AND FOREST PRODUCTS LABORATORY
PROGRAM LOCATIONS
HEADQUARTERS OF REGIONAL FOREST EXPERIMENT STATIONS
FOREST PRODUCTS LABORATORY
WASHINGTON - BELTSVILLE
ALASKA
JUNEAU
NORTHERN
PACIFIC NORTHWEST
PORTLAND
INTERMOUNTAIN
OGDEN
LAKE STATES
ST PAUL
FOREST PRODUCTS LABORATORY
MADISON
NORTHEASTERN
UPPER DARBY
WASHINGTON, D.C.
CENTRAL STATES
COLUMBUS
ROCKY MOUNTAIN
FORT COLLINS
PACIFIC SOUTHWEST
BERKELEY
HAWAII
SOUTHERN
NEW ORLEANS
SOUTHEASTERN
ASHEVILLE
RIO PIEDRAS
PUERTO RICO
INSTITUTE OF TROPICAL FORESTRY

FORESTRY RESEARCH is carried on by the Forest Service at its 10 regional Experiment Stations, the National Forest Products Laboratory, the Washington Office, the Institute of Tropical Forestry, and with cooperating universities. Scientists study the growth and harvesting of timber; protection of forests from fire, insects, and disease; management of rangelands and wildlife habitat; outdoor recreation; protection and management of watersheds; efficient and economical utilization of forest products; and forest economics. A continuing forest survey provides comprehensive information on the extent and condition of forest lands, the volume and quality of timber resources, trends in timber growth and harvest, and the outlook for future supplies and demands.

Progress Through Forestry Research

A new industry—the manufacture of plywood from southern pine—was started in the South in 1963, following several years of basic and applied research on the problem.

One large plywood plant was completed in Arkansas and two others started in Texas to make sheathing-grade plywood. Investments in these initial plants and equipment are expected to total $7 million. When in full operation the plants will employ 400 to 500 workers and provide an annual market for 50 to 70 million board feet of southern pine logs. Value of the finished plywood is expected to be some $10 million per year. Other plants are in the planning stage.

Previously, larger trees such as Douglas-fir of the Pacific Northwest were required for sheathing-grade plywood. But research solved the many technical problems posed by the smaller, second-growth southern pines. Technical information was developed on requirements for structurally sound grades of plywood, and assistance was given to industry and the Department of Commerce in developing a commercial standard for southern pine plywood.

FOREST PRODUCTS UTILIZATION RESEARCH

Wood Quality in Standing Trees

Specific gravity is the best general measure of several important wood-quality characteristics. However, until recently the confidence in specific gravity determined from standing trees was limited by the uncertainty about proper sampling methods. In a large industry-supported program, increment core sampling of 30,000 trees of 25 species from 11 Western States was completed in 1963. Related data also were obtained from 1,400 felled and dissected trees of the 9 highest priority species to determine the relationship of core specific gravity to that of the whole tree. Prediction equations were developed, using tree diameter and specific gravity of the breast-height increment core to estimate average tree specific gravity.

Also, mass sampling and processing of southern pine increment cores from Georgia, Florida, Arkansas, and Alabama was continued. One of the major markets for southern pine in this area is for pulpwood, so specific gravity has immediate practical significance. A difference of only 0.02 in specific gravity is equivalent to 100 pounds in the weight of a cord of dry southern pine pulpwood, or 50 pounds of dry pulp per cord. These values support the trend toward buying pulpwood by weight instead of volume.

Improved Log Grades for Ponderosa Pine

An improved system has been developed for grading ponderosa pine and sugar pine logs in standing trees. Previously at least four different grading systems for pine logs were used in the West. The new system, which has been adopted by the Forest Service, has distinct advantages over the old systems. It gives better separation between grades, is more consistent, and is easily learned and applied. As local lumber-yield tables are developed, widespread use of the system by other Government agencies and by industry is anticipated.

Uses for Low-Grade Logs

An urgent marketing problem at Arizona and New Mexico ponderosa pine sawmills prompted a large-scale investigation of the possibilities of making various building components from low-grade material, including low-quality logs, low-grade boards, and shavings.

A number of products were made, several of them entirely new. Together, they comprise all the essential structural components of a house shell, and all can be factory produced for rapid assembly at the building site. Included are vertically laminated members made by gluing boards together to serve as floor or roof beams. Boards were also used to make several types of house siding by covering their knots and other defects with vulcanized fiber or with resin-treated kraft or parchment paper.

A new type of flooring that utilizes grooved boards as the base for hardwood veneer surfaces demonstrated another product for which knotty ponderosa pine boards are suitable. Thick veneer was found adequate as the facing for subflooring panels in which boards were used as the core material. Thinner veneer, glued together into three-ply plywood, served well as underlayment for resilient-type finish floors.

Shavings and flakes, converted into four types of particle board, provided materials suitable for wall paneling and for the concealed parts of cabinets and furniture. A three-ply particle board was designed for use as door cores, interior partition, and roof decking; it consisted of pulp chips bonded together to form the central layer, with conventional flakes used for the outer layers.

Prestressed Laminated Wood Beams

The concept of prestressing glued laminated wood beams with steel wire cables received preliminary evaluation, and it offers promise of increasing allowable loads by substantial margins. Studies show that proportionally greater increases in strength result when the reinforcing steel strands are used in the lower structural grades of beams. Prestressing is accomplished by stretching steel strands that are inserted in prepared holes in the lower parts of the beam. It induces an upward bow in the beam, actually putting a compressive stress into the part of the beam that would be under tensile stress in service. Research is being continued to further investigate this effect and to develop methods of design for commercially prestressed laminated beams. Major benefit may accrue to the laminating industry.

FOREST ENGINEERING RESEARCH

Harvesting Whipwood

Engineering research in one of the most important forest activities—the harvesting of timber—has resulted in the development of a system to log small wood economically (2 to 6 inches in diameter, 40 to 50 feet high). A newly designed low-cost portable skidder is used. The system appears to offer significant cost savings in clearing land for replanting and for thinning operations. Also the small wood can be used for wood chips instead of being disposed of by burning or crushing.

Pipelines Transport Chips

Work has also progressed on design criteria for a pipeline system for transporting wood chips. A mathematical model has been developed by which various pipeline designs can be evaluated. Costs per ton-mile for chips can be determined for pipe diameters from 6 to 20 inches and lengths from 10 to 500 miles.

Logging With Helicopters

Studies reported in 1963 have shown that use of helicopters in logging has the potential to reduce access costs, make otherwise inaccessible timber available, and reduce damage to watersheds and recreation values—provided operating costs can be reduced. Two critical operating problems now show promise of early solution: (1) Scale studies of special accessory equipment to permit quick hookon and fast release of logs have led to the design of full-scale mechanical log grapples, now ready for construction and test; and (2) a cooperative research study at the University of Washington is developing a means of accurately estimating western hemlock log weights to permit efficient loading of helicopters. In other research, studies were made of the use of helicopters to drag or pull loads instead of lifting them vertically. Trial tests on dry ground and in water have been completed.

Logging With Balloons

The true skyhook, now being tested, is in reality a helium-filled balloon used in conjunction with conventional high-lead cable logging systems. It permits longer yarding distances, reduces log damage, and facilitates operations in adverse terrain. Joint studies with industry are underway in evaluating balloons, with the aim of reducing logging costs and protecting the soil on steep and rough terrain.

FOREST ECONOMICS AND MARKETING RESEARCH

Timber Statistics Updated

For the past year and a half a comprehensive study has been under way to reappraise the status of our Nation's timber resources as of 1963 and the outlook for future timber supplies and demands. Such national appraisals are made periodically as a basis for policies and action programs of forestry agencies, forest industries, landowners, and others. The last previous appraisal was based on data gathered primarily in 1952. A detailed report on results of this analysis of the timber situation and outlook will be completed in 1964.

Preliminary findings show that significant increases in forest areas, timber volumes, and timber growth have been achieved in recent years. Total timber growth exceeds the total cut, although growth is still deficient in trees of the larger diameters and preferred species. Projections of prospective demands show substantial increases for pulp, paper, veneer, and plywood, and modest increases for lumber. Prospective timber supplies appear sufficient to meet most timber demands during the next few decades, but increasing supply problems for veneer logs and high-quality saw logs, and increasing problems of timber cost and merchantability are in prospect.

Outlook for the Douglas-Fir Region

The longrun timber growing potential of western Washington and western Oregon has been estimated in a recent study at 13.1 billion board feet annually, plus 0.4 billion cubic feet of smaller material. This estimate takes into account expected responses of various classes of owners to prospective economic influences in the business of growing timber, and assumed changes in ownership of commercial forest land.

According to present trends in forest management and rates of timber harvesting, it will take more than a century in this region to cut out all timber older than the economic rotation ages estimated in the study. These trends also indicate that the annual log harvest can remain consistently above the average level of 11.5 billion board feet harvested in the 1950's and increase gradually toward the estimated longrun potential. However, major shifts of the location of the log harvest within the subregion have been prominent, and further shifts are to be expected. More rapid intensification of forest management than present trends suggest, and some acceleration of conversion of old growth to young growth in the subregion might improve the level of harvest in the transition period of the next few decades.

Housing and Lumber Use

Results of a recently completed study of housing characteristics show that plywood, fiberboard, and other wood and nonwood materials continue to displace lumber for such uses as sheathing, subflooring, and siding. However, the total lumber content of new, single-family homes has changed little during the past decade because of an increase in average size of houses built and the increasing practice of adding a garage or carport.

The lumber content of new single-family homes differs greatly among the various regions of the country. In Florida, for example, where less than 10 percent of the homes are of wood-frame construction, lumber use per FHA-inspected house averaged approximately 5,600 board feet in 1962. In the North Atlantic region, where approximately 90 percent of the houses have wood-frame exterior walls, lumber use per house averaged about 11,600 board feet.

This study is a part of a continuing analysis of opportunities to expand markets for timber products for various end uses such as construction, manufacturing, and shipping.

TIMBER MANAGEMENT RESEARCH

New Guide for Central Hardwoods

New prescriptions for managing upland central hardwoods are contained in a Forest Service publication that makes several notable changes from previous management recommendations. It recognizes the need to use even-aged silviculture for reproducing and growing central hardwoods. It recognizes site quality as the basis for selecting the species to favor. It recognizes the necessity for regular thinnings to maintain rapid growth on the size class selected as the final crop. The guide contains new descriptions and tables for classifying and identifying different degrees of site quality. It describes new concepts of optimum stocking for central hardwoods and tells how to measure and control stand densities. And it contains a key to silvicultural prescriptions for common stand conditions encountered in the Central States.

Although prepared specifically for use on the National Forests, principles and procedures in the guide are equally applicable to State forests, industrial holdings, and farm woodlands. Use of the guide will result in full utilization of a forest site in the production of high-quality timber under the shortest rotation feasible.

New Tables Show Stand Growth

To provide up-to-date estimates of yield of red pine in managed stands, the Lake States Forest Experiment Station has issued new tables for growth and yield. They are applicable to stands of red pine ranging from 25 to 165 years of age, thinned to different densities. The tables will be valuable in guiding the management of red pine for the production of a wide range of products. On better quality land, managed red pine stands are capable of producing up to 1.8 cords per acre per year of current growth.

Ponderosa Pine Growth and Seed Origin

Two early Forest Service studies in the Northwest, one 30 years old and the other 45 years old, show convincingly the geographic variation in growth rate and other characteristics of ponderosa pine. Growth rate increased from east to west in the range of the species. Also the inherent growth rates were related to springtime temperatures and yearly rainfall patterns of the seed source. Bole taper, frost resistance, resistance to animal damage, time of beginning and ending of seasonal growth, and rate of seasonal growth were related to seed source, also. This basic information on the geographic variation in a widely distributed timber tree will help to guide tree planting and tree improvement programs in the ponderosa pine regions of the West.

Seed Origin and Southern Pine

Important trends are evident in the first 5-year measurements of the Southwide Pine Seed Source Study, a very large cooperative effort of numerous Federal, State, educational, and industrial agencies. In substantiation of earlier evidence, planted slash pine shows very limited growth difference attributable to seed source. But the other three major pine species show considerable differences.

Planted loblolly and shortleaf pine show more variation among seed origins from a north-south transect than from an east-west transect. A very high correlation was found between the height of loblolly pines planted in Maryland and the latitude of the seed source. Local stocks were generally above average in growth, but they were sometimes excelled by individual nonlocal strains of easterly or southerly origin. The incidence of fusiform rust was also found to be related to seed source; infection was least in the most westerly strains. This Southwide cooperative study will be increasingly valuable as longer performance records are accumulated.

Hybrid White Pines Resist Disease

The resistance of hybrid white pines to blister rust is strongly related to the combined resistance of the parental species. Of three parent species used in a California study, western white pine is very susceptible, eastern white pine is susceptible, and Himalayan white pine is resistant. After 11 years exposure to the blister rust fungus, all hybrids between eastern and western white pines were dead; 92 percent of those between western white and Himalayan white pines were dead; but 66 percent of those between eastern white and Himalayan white pine survived. Although the eastern white pine × western white pine hybrids have low resistance to blister rust, they have shown extremely high vigor in plantings in northern Idaho. After 8 years the hybrids were about twice as tall as western white pine seedlings having the same female parent as the hybrids.

FOREST FIRE RESEARCH

Electronic Fire Detection

Airborne infrared scanning equipment that can locate and map fires through clouds or dense smoke was tested operationally in 1963. Results have been most promising. With this instrument one can quickly discern details of the perimeter of a fire, pick up extra-hot burning areas that threaten breakouts, and quickly locate spot fires thrown from the main fire. By repeating the mapping at intervals, the growth of a fire and its rate of spread can be accurately determined. Trials on three wildfires have shown that the fire boss can obtain vital intelligence in minutes with infrared scanning techniques where normal ground surveillance measures may take hours. Because this equipment operates equally well day or night, it can be used for detecting small fires at night when human lookouts are ineffective.

Operations Research

Operations Research techniques are very useful in finding the optimum combination of factors to achieve a given result. They are being adapted and applied to an expanding number of fire control problems. One study has led to the best search procedure for a lookout to follow in scanning an area for fires. The study is now being expanded to determine the optimum distribution of lookout stations needed to achieve adequate coverage of a fire protection unit with the least number of men. Other investigations will determine how to avoid communication system breakdowns on large fires and how to improve fire camp management.

Fire Prevention Research

In a different approach to the fire prevention problem, chemical fire retardants are being modified to provide effective, season-long fireproofing along roadsides, campgrounds, and other high hazard areas. Until recently the use of chemicals has been greatly restricted because the available materials were toxic to plant life, thus leaving the ground exposed to the threat of erosion, or they were highly soluble and easily rendered ineffective by summer showers. New studies indicate that certain phosphates and sulfates can be rendered relatively insoluble and still retain their fire-retarding qualities. Thus it may be possible to reduce the threat of ignition in susceptible areas without disturbing the natural ground cover.

FOREST INSECT RESEARCH

An insect predator (*Enocleris* sp.) appears to have played a prominent role in the decline of a recent outbreak of the roundheaded pine beetle in ponderosa pine in southern New Mexico. Studies in the outbreak area showed that much of the beetle mortality occurred during a period when there were 15 predators per square foot of bark of infested pines.

A significant reduction in a gypsy moth population in Connecticut was achieved experimentally by spraying with an extremely heavy concentration of virus polyhedra in water. Following application of the virus spray, there was a marked reduction in the degree of defoliation of trees in the treated area when compared with trees in adjacent untreated areas. The virus spray, consisting of one trillion polyhedra per gallon of water, was applied at the rate of 4 gallons per acre.

Valuable information was accumulated on the possibilities of using the microbial insecticide *Bacillus thuringiensis* in forest insect control. There is growing evidence that current commercial preparations of the material contain components that are repellent to some insects, thereby resulting in a reduction in the amount of feeding they do

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and the amount of insect mortality that occurs. Additional research could result in the development of more selective strains of the organism for the control of specific insect pests and, possibly, to development of a formulation that can be applied from the air.

Cultural Control

Recent research indicates that a cultural technique, known as snow-depth pruning, will significantly reduce populations of the European pine shoot moth in young pine plantations in the Lake States. Snow-depth pruning consists of the removal of low branches that may be partially or completely covered by snow during the winter. With their removal, the only remaining branches in which the shoot moth can pass the winter are those above the snow, where they may be killed by the low winter temperatures occurring in the region. In experimentally treated plantations, this type of pruning has resulted in population declines of the shoot moth.

Chemical Control

Control of the mimosa webworm, a serious pest of mimosa and thornless honeylocust in nurseries, can be secured for an entire growing season by the application of granules of either of two systemic chemicals, Di-Syston or phorate. Research has shown that the best method is to apply the granules in bands 24 inches wide on opposite sides of the trees, and immediately cultivate the soil to mix in the granules. By rigid adherence to recommendations, this control method presents no hazard to birds or other forms of wildlife.

Recent research in California has demonstrated that the chemical lindane dissolved in diesel oil can be used in winter to control bark beetles just as effectively as in warmer seasons of the year. On the basis of this finding, it should no longer be necessary to use the more expensive bark-penetrating sprays, such as ethylene dibromide, in bark beetle control projects conducted during the winter. An added benefit would be that a single insecticide can be used throughout the year.

Sex Attractant: Antipest Weapon

Recent studies in Mississippi have shown that female carpenterworm moths produce a powerful sex attractant. Techniques are being developed for rearing the insect in sufficient numbers to obtain enough females to collect and identify the attracting substance. This may lead to the synthesis of the attractant material and its use to lure male moths to poison baits or to chemicals that will sterilize them. Carpenterworm larvae damage oaks and other hardwoods.

FOREST DISEASE RESEARCH

Rust-Resistant Planting Stock

Obtaining western white pine planting stock with a useful level of resistance to white pine blister rust is largely a matter of time and continued development work. Quite literally, the decade-old research and development program of the Intermountain Station and Region 1 will begin to show results about 1980. By then, 100 acres of rust resistant first-generation selections grafted in seed orchards will be crossing naturally among themselves and mass-producing F_2 seed that will yield an acceptable ratio of resistant trees for planting stock.

By planting this stock, economical blister rust control will be achieved on the hundreds of thousands of white pine acres destined for future planting. This does not mean that current blister rust control efforts will have been completed on those areas, or that current blister rust control measures can be abandoned by 1980. It does mean, however, that after the semiresistant F_2 stock becomes available, both the size and cost of the control job will gradually become smaller and smaller. Research will continue to develop still more highly rust resistant types and to incorporate other desirable growth characteristics into this superior planting stock.

FOREST RECREATION RESEARCH

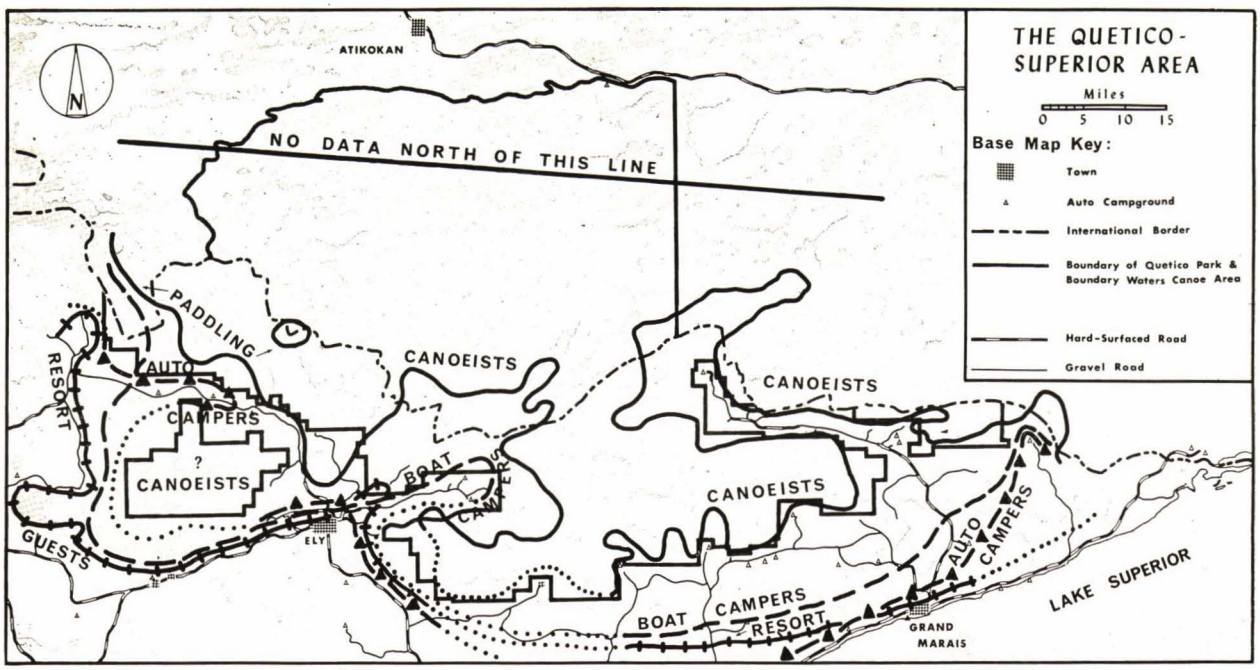
Studies of Forest Recreation Visitors

On the Boundary Waters Canoe Area in northern Minnesota, the only "semiwilderness area" in the National Forests, recreation under primitive conditions occurs together with logging that is limited to protect scenic values. Interviews with visitors in all parts of the area, some parts of which were being logged, suggested good acceptance of this unique plan of management. Only 18 percent of the visitors reported noticing that logging was taking place, and only 5 percent were bothered by it.

The conflicts between recreationists appear more serious. Recreational use in the Boundary Waters Canoe Area has increased about 12 percent a year since 1946; more than 200,000 visits were counted in 1961. At this rate, more than a million visits would be tallied in 1976. If this occurs, solitude may disappear.

Solitude and wilderness are subjective concepts and hard to define, but research has shed some light on how visitors see the wilderness in the Canoe Country. Many different types of visitors come to the area—canoeists, boat campers, fringe campground campers, summer-home users, resort guests, and 1-day fishermen.

Canoeists were the largest group in 1961, and they saw wilderness differently than did the other visitors. They considered wilderness the main appeal of the area, setting a high standard for their wilderness. The more visitors an area had the fewer canoeists saw it as wilderness, but this loss of wilderness was fairly gradual unless motorboats used the area. Even light motorboat use destroyed the wilderness environment as most canoeists saw it (61 percent disliked meeting motorboats—far more than objected to logging).



The areas considered "wilderness" by at least 50 percent of the visitors in each of four major user types named on the map.

The area in the interior, away from the roads and generally to the north of the line for each user type, was rated as "wilderness" by 50 to 100 percent of the visitors of that type reaching the area. Dotted lines indicate places where data were lacking, and subjective estimates have been made, based on 1960 data.

Other types of visitors—most of whom used motorboats—had a different picture of the wilderness. Fishing and scenery equaled or exceeded wilderness as an appeal. Their wilderness was not even lost where recreational use was fairly heavy, and simple roads were accepted. A large area, much of it outside the boundaries of the Canoe Area, met these standards and was viewed as wilderness by boaters.

Crowding and conflicts were accentuated by the very uneven distribution of visitors. A few places were crowded, but large areas were very lightly used. Over half of the visitors in each class were concentrated at 10 percent of the 60 possible access points on peripheral lakes and streams. Over half of the canoeists began their trips at *one* lake.

With this information about use patterns and wilderness standards, management may be able to give more people an opportunity to enjoy the wilderness.

Locating and Evaluating Forest Recreation Sites

Lake depth is a critical factor in evaluating the recreation utility of lakes for recreation planning purposes. Difficult accessibility of high mountain lakes in the western part of the United States makes field measurement of such lakes costly and time consuming. Aerial photo interpretation techniques have been developed to measure the depth of remote mountain lakes. Lake perimeters to depths of 15 feet can be measured at one-tenth the cost of field soundings. In a related study, aerial photo techniques have been developed to evaluate fish habitat quality and the general condition of high altitude trout streams. These advances will enable land managers to better estimate differences in recreational utility of various streams, required habitat improvements, and the effects of manmade differences such as roads and logging.

FOREST SOIL AND WATER RESEARCH

Evaporation Losses Reduced by Chemical

Two inches of water were saved the first year and one-half inch the second year after hexadecanol was applied to bulldozed sites in the Sierra Nevada of California where small pine trees had been planted and sprouting brush had returned. Hexadecanol is a chemical used on reservoirs to prevent evaporation. No reduction in evapotranspiration occurred when the same amounts were applied to natural brush fields.

When hexadecanol was sprayed on snow at the rate of about 12 pounds per acre, evaporation reductions ranged from 13 to 90 percent. Greatest reductions were in large open areas and on exposed ridgetops where evaporative losses are usually greatest. Chemical suppression of evaporation may result in important savings of water for other uses.

Chemical Defoliation and Water Yield

In a study in western North Carolina, trees in full leaf used almost 5 inches more water per month during midsummer than did trees defoliated in late June by spraying with a commercial weed killer. After spraying there was no measurable loss of water from the two defoliated plots for the rest of the growing season, the total water saving being equivalent to about 10 inches of rainfall. Indications are that the water savings might have been greater had the plots been defoliated earlier in the year. Chemical defoliation to temporarily reduce transpiration losses offers a promising technique for increasing streamflow during emergency periods of low water supply or drought.

More Late Summer Streamflow

In an experiment conducted in the Colorado Rockies, snowfences 8 feet tall, located upwind from natural accumulation areas near main ridgelines, increased snow accumulation so that by July 1 there was the equivalent of 700 cubic feet more water per linear foot of snowfence than was found on a comparable unfenced check area. In mid-August, almost half of this snow still remained and there was none on the check area.

Snowdrifts 20 to 30 feet deep commonly form in protected pockets of ravines and behind obstructions in the high alpine areas of the Rocky Mountains. These drifts melt slowly in the summer, maintaining streamflow long after lower-elevation snow has melted. There is only slight net loss of water by evaporation from alpine snowfields; therefore, this is a rather efficient system for storing water to sustain streamflow during the late summer months.

Cutting Results in Water Savings

Significant savings of soil moisture from logged subalpine forests in the Sierra Nevada of California are likely to continue for 16 years. Observations of a number of logged areas showed that 7 inches of water were saved in the first year following logging; after 5 years the savings were still 2.9 inches; and after 10 years, 1.2 inches per year. In the 12th year, water savings were only 0.7 inch, but the accumulated total in the 16-year period was estimated to be 34 inches, or nearly 3 acre-feet of water for each acre logged. This means more water available for streamflow.

RANGE AND WILDLIFE HABITAT RESEARCH

Managing Semidesert Range

Flexibility in the size of cattle herds is necessary for adjustment to the large fluctuation in forage produced from year to year on semidesert grassland ranges in the Southwest. Since 90 percent of the perennial grass growth occurs in the summer, the size of the herd can be balanced with the forage crop at the time of shipping the cattle in November. A herd with a ratio of four yearlings to six cows is desirable because it permits up to 40 percent reductions in animal numbers through the sale of all yearlings in years of poor forage production. Best use of these ranges is achieved by grazing tobosa grass during the summer growing period when it is most succulent and palatable, and reserving the highly nutritious black grama for fall-winter-spring use when this species is dormant and least subject to injury from grazing.

Converting Hardwood Stands to Grass

Ozark forests with low capacity for hardwood timber production can be converted to highly productive rangelands. One acre of forest range improved by spraying with herbicides to control hardwoods, seeding to K31 fescue and small bluestem, and fertilizing can produce as much forage as 20 to 100 acres of unimproved range. Control of hardwoods by spraying greatly increases herbage production; however, on deteriorated forest ranges it is also necessary to seed grasses or most of the herbage increase will be weedy species. Seedbed preparation or summer burning improves grass establishment. Type conversion and utilization of the forage by livestock gives promise as a profitable management practice for many Ozark areas now supporting low-value hardwoods such as blackjack and post oaks.

Turkeys Increase as Habitat Improves

The wild turkey population of the Broad Run area on the Jefferson National Forest in Virginia has increased ten times in a pilot test of habitat improvement. Beginning with 12 birds in the fall of 1957, numbers on the test area increased to more than 125 birds by 1963. Management included establishment of bluegrass and ladino clover in clearings, small impoundments for watering, and stepped-up timber cutting and stand improvement measures. Although there have been general increases in turkey numbers elsewhere, this local and substantial rise undoubtedly reflects favorable response to forest land management treatments in the test area. Very heavy use of seeded clearings by turkey broods for insects, grass and weed seeds, and herbage probably have been major contributing factors.

Conifers Reduce Deer Forage

Deer forage is being greatly reduced on summer ranges in Utah by the invasion of conifers into aspen stands. As basal area of conifers increases, amount of aspen, volume of forage, and intensity of deer use decrease. Forage in aspen stands was eight times greater and deer use about seven times greater than on similar sites now dominated by conifers. On many areas where conifers are invading aspen stands, the sites are too poor to produce merchantable timber. Such areas might well be managed primarily for wildlife and other uses by altering the natural succession.

FOREIGN FORESTRY SERVICES

The international forestry activities of the Forest Service involve training and technical assistance in foreign aid programs, exchange of information in meetings of international organizations, and the translation of important scientific documents.

Training Foreign Nationals

The Branch of Foreign Training prepared or assisted with the preparation of 141 training programs or study tours in the United States for 224 foreign nationals from 58 countries. In addition, eight programs were prepared for eight employees of the Agency for International Development who wished to acquaint themselves with current U.S. field practices in forestry and related disciplines. The program and itinerary prepared for each individual or team provided for academic, on-the-job, or observational training, or a combination of these, in a variety of forestry and related fields.

The Forest Service had primary responsibility for 60 percent of the programs in which it participated. Of the 141 programs for foreign nationals, 116 were prepared for individual visitors, and 25 were for teams of from 2 to 20 members. Included was an annual short course in tropical forestry conducted by the Institute of Tropical Forestry in Puerto Rico for 20 participants.

The aggregate foreign training workload carried out by field units of the Forest Service totaled nearly 3,600 participant man-days. This was 1,100 man-days over 1962—an increase of nearly 45 percent.

Technical Consultation and Support

Requests for technical information received from 78 countries ranged from procurement or exchange of seed and pollen to the transmission of technical publications and information on practically every aspect of forestry and wild land use.

Specialists were sent to Brazil, Trinidad-Tobago, the Dominican Republic, and Kenya on short-term assignments to tackle problems in fire control, forest inventory procedures, sawmilling practices, and brush control. Assistance in recruiting foresters for the Peace Corps continued. Technical assistance was given in connection with overseas research in four countries. Forest Service scientists reviewed research in forest products, entomology, and tree nutrition, financed by foreign currencies under P.L. 480 at research centers in four countries.

International Organization Activities

Participation in international meetings related to forestry included the meeting of the Forestry Committee of the Twelfth Session of the Conference of the Food and Agriculture Organization of the United Nations and the International Consultation on Plywood and Other Wood-Based Products, both of which were held in Rome, Italy; the meeting of the Permanent Committee of the Union of Forest Research Organizations in Finland; a World Consultation on Forest Genetics in Sweden; and the Biometrological Congress and the Meeting of the Forest Seed Group of the Organization for Economic Cooperation and Development in France.

The Second Session of the North American Forestry Commission, held in Ottawa, Canada, was attended by a U.S. delegation. The session reviewed the progress that Mexico, Canada, and the United States had made in resolving mutual forestry problems and planned future action. The Fifth Conference on Wood Technology, sponsored by FAO and held in Madison, Wis., considered the increasing importance of foreign species of wood and wood-based products in U.S. commerce. Assistance was also given in arranging for the Forest Products Section of the International Union of Forest Research Organizations which met in Madison, Wis., just prior to the Wood Technology Conference. Forest Service representatives helped prepare for the FAO-sponsored World Food Congress that was held in Washington, D.C., and which attracted 1,600 participants from 105 countries. An official U.S. banquet was included, commemorating the 20th anniversary of the Hot Springs Conference which led to the establishment of FAO.

FORESTS COVER ONE-THIRD of the land in the continental United States. Nearly 70 percent of the commercial forests is owned by private citizens. The Forest Service cooperates with State agencies and private forest owners to (a) protect 431 million acres of State and privately owned forests and watersheds against fire, insects, and diseases; (b) encourage better forest practices for conservation and profit on the 358 million acres of private forest land; (c) aid in distribution of planting stock for forests and shelterbelts; and (d) stimulate development and management of State, county, and community forests.

Cooperation—State and Private Forestry

The service forester reports: "In 1949, Mr. Murd (not his real name) acquired 100 acres of land—67 in timber and 33 in cultivation. In 1950, Mr. Murd requested management help from the service forester. A management plan was drawn up, and shortly thereafter the forester marked for thinning 85,000 board feet of timber on the land.

"Mr. Murd sold his sawtimber to the highest bidder for a substantial sum. In addition, from thinnings he sold 200 cords of pulpwood for $3,100.

"Income from the 67 acres of woodland has helped Mr. and Mrs. Murd send two children to college and build a new home.

"Recently a power company built a dam nearby that formed a lake on portions of the Murd forest. Since their woodlands had been managed and cared for, Mr. Murd was able to build camp and picnic sites along the water. These recreation sites are rented to people during the summer months. Thus, under multiple use, the Murd woodlands are adding in two ways to the family income."

—This is one of many similar reports in Forest Service files on how the cooperative forestry program—working through the State employed service forester—helps the private woodland owner.

Multiple Use Management

The above example shows something of the rapidly expanding practice of multiple use management on State and private lands within the past few years. The Forest Service has helped in this trend by providing leadership, technical assistance, and training through the Cooperative Forest Management Program, the General Forestry Assistance Program, and Rural Areas Development. Prudent management of the forests for timber, water, recreation, and wildlife resources and for special forest products provides opportunities for greater profits to the owners; such management also provides the forest lands needed to meet special demands of the public.

Opportunities for increased use of forest resources include wildlife areas managed for public hunting at daily or annual fees; recreation developments open to the public at a reasonable charge; and harvest of special forest products such as Christmas trees, decorative material, ornamental plants, seeds and nuts, and other items that provide an income while the timber crop matures. Federal-State cooperative programs offer guidance to individual landowners for these and other multiple use developments of their land.

Working With APW

Under the Accelerated Public Works program, 22 States received Federal grants-in-aid amounting to more than $2 million for 285 projects in more than 150 counties. These funds were used primarily to accelerate cooperative forestry projects. The Forest Service reviewed and made recommendations on all projects.

FORESTS AND RURAL AREAS DEVELOPMENT

In Webster Springs, W. Va., a town of about 2,000 population, a new woodworking plant utilizing local hardwood has brought new jobs to 70 people and a weekly payroll of $2,000 to the community. "This used to be a coal-mining town," said Mayor C. E. Dodd, "but the coal business is gone now, and our future is definitely in wood and other forest resources such as hunting and fishing."

The varied and versatile resources of forests were proving to be money in the bank for thousands of small, depressed rural communities. Under the Department of Agriculture's renewed drive in Rural Areas Development (RAD), the Forest Service moved on many fronts to make forests contribute wherever possible to the economic life of communities. Many low-income rural communities were discovering that the often overlooked resources—water, wood, wildlife, recreation, special novelty wood products—could bring local jobs and new prosperity.

The Forest Service had representatives on RAD Technical Action Panels in every State and Puerto Rico. They reviewed and made recommendations on more than 200 county and community development programs during the year.

COOPERATING WITH THE STATES

The Federal Government shares with the States the cost of carrying on the work of the Cooperative Forest Management Act. Last year State expenditures for this purpose amounted to $3.3 million; the Federal share was $2.5 million. During this period 691 foresters, employed by the 48 cooperating States and Puerto Rico, helped 101,823 forest owners to apply better management practices to their land. This involved 5,762,008 acres, or 2.2 percent, of the Nation's small forest acreage. Gross returns to these owners from the sale of forest products amounted to $13.7 million. More than 9,100 small forest products operators were also assisted.

General Forestry Assistance

In this program, the Forest Service provides highly specialized technical services for the more adequate management and utilization of forest resources for the benefit of landowners, processors, and the local, State, and national economies. Those assisted include managers of large forest properties, forest products processors and dealers, Rural Areas Development committees, State and area development planners, State forestry organizations, universities and schools, industrial and consulting foresters, and other Federal forest property managers.

The Forest Service has helped in activities such as: Area Redevelopment Administration projects concerned with forest industry and forest-related recreation; development of multiple use management plans for individual large public and private forest properties; assistance to timber processors in plant layout and operation; studies of raw materials needs for individual plants to assure effective use of local resources; training of forester technicians in the application of continuous forest inventory; and the management and marketing of special nontimber forest products such as Christmas trees.

In 1963, Forest Service personnel, with the assistance of State foresters, investigated 130 ARA project proposals in the fields of forest industry and forest-related recreation. These ARA project proposals totaled over $41 million.

Technical assistance in forest inventory, forest management, and processing was provided for 8½ million acres of State and private lands; 380 forest owners and processors were involved.

Tree Planting Continues at High Level

Forest and windbarrier planting on all classes of land amounted to 1,362,699 acres (including 221,517 acres of direct seeding). Of this total, 73 percent was on private land, 20 percent on Federal land, and 7 percent on other non-Federal public land. Overall accomplishments in most instances were slightly less than for 1962. The bulk of the planting, in 13 States and on privately owned land, was as follows:

Acres planted on privately owned land

State:	*Industry owned*	*Other privately owned*	*Total*
Florida	96, 867	28, 729	125, 596
Georgia	80, 225	41, 592	121, 817
Alabama	49, 575	26, 253	75, 828
Mississippi	28, 101	47, 007	75, 108
Louisiana	55, 992	10, 539	66, 531
South Carolina	20, 878	36, 728	57, 606
Oregon	45, 991	4, 502	50, 493
North Carolina	31, 209	17, 615	48, 824
Virginia	28, 053	17, 811	45, 864
Pennsylvania	19, 966	18, 184	38, 150
Wisconsin	3, 830	27, 385	31, 215
Texas	23, 580	6, 861	30, 441
Tennessee	10, 328	20, 002	30, 330

Two hundred forty-nine forest tree nurseries in 46 States produced and distributed 1,008,389,000 trees that were used to plant 1,141,182 acres. Of this large volume of planting stock (including Christmas tree and windbarrier planting) 99 State-owned nurseries produced 61.4 percent; 26 forest industry nurseries, 18.4 percent; 16 Federal nurseries, 12.5 percent; 95 private commercial nurseries, 6.4 percent; and 13 other non-Federal public nurseries, 1.3 percent.

Direct seeding by hand, machine methods, or airplane was accomplished in 39 States on 221,517 acres; 65 percent was on private lands, 29 percent on Federal lands, and 6 percent on non-Federal public land. The direct-seeded acreage has increased each year. Windbarrier plantings, mainly in the Great Plains States, were made on 36,011 acres with 34,791 acres planted on privately owned land.

COOPERATIVE FOREST FIRE CONTROL

Fire Damage Up for 1963

Forests in Eastern United States were tinder dry and ripe for burning in 1963. From early spring to late fall, they needed only a spark to leap into flame. The unusually prolonged drought and the heavy use of wildlands by the public could have resulted in a major catastrophe. Damage

was severe (the worst since 1955), but the record was kept from being much worse only by prompt and effective fire prevention programs and vigorous fire suppression action. In the West, favorable weather helped keep major fires down in the vast tangle of timber blown down on Columbus Day 1962.

The drought in the East and Southeast was largely responsible for an increase in the number of fires and the acreage burned in 1963. State and private forest ownerships reported about 153,000 fires as compared with 104,924 fires during the previous year. About 6,900,000 acres were burned as against 3,808,000 acres in 1962.

New Studies and Better Reporting

State Foresters are now making detailed studies of the State and private forest lands and the nonforest watersheds that need organized forest fire protection. The purpose of these studies is to determine the areas needing protection and the cost of an adequate program for these lands. Several States will be making these studies for the first time. Meetings have been held to correlate the results between the States and Regions.

The collection and reporting of more meaningful fire statistics by the States has resulted in a more complete annual publication of forest fire statistics for forest fires on Federal and non-Federal lands in 50 States. Statistics on the impact of fire damage to timber resources are now being collected and reported for the first time, as are statistics on the damage to recreation, wildlife, water, and forage.

Information for Publications

Material relating to State forestry administration has been prepared for publication in "The Book of the States," a publication of the Council of State Governments. Through membership on the Forest Committee and Rural Fire Protection Committee of the National Fire Protection Association, the Forest Service provided material for the preparation of technical publications.

COOPERATIVE FOREST FIRE PREVENTION

Prevention, a Part of Control

Intensified fire prevention efforts played a big part in keeping a bad fire season in the East from becoming a disaster. Both the National and the Southern CFFP (Smokey Bear) programs were stepped up in the face of critical fire danger in many areas. Many on-the-ground prevention measures were taken in Eastern States including the complete closing of forest areas. It was a hard year for Smokey Bear, yet his efforts produced worthwhile results.

CFFP Effort Moves Ahead

The Smokey Bear message reached many millions of people in 1963. About 22½ million items, including posters, bookmarks, calendars, stamps, comic books, and bumper stickers were produced and distributed. Radio kits were sent to 3,600 stations and television kits went to 650 stations. In addition, a special emergency mailing was made to all stations in the Northeast where fire danger was high. A new teacher's kit on conservation and forest fire prevention was prepared and 49,000 were distributed.

Smokey Bear broadcast material made over 2 billion home impressions. The estimated value of air time contributed by broadcasters exceeded $10 million. In addition, space valued at $3 million was donated for Smokey Bear newspaper and magazine advertisements, car cards, and large "3-sheet" posters.

During 1963, the National Education Association and the Society of American Foresters received Golden Smokey Awards for outstanding service to forest fire prevention. Smokey Bear Plaque Awards were made to Don Dedera, a Phoenix, Ariz., newsman; the Custer Volunteer Fire Department of Custer, S. Dak.; Liller, Neal, Battle, and Lindsey, volunteer advertising agency of Atlanta, Ga.; and X. L. Pellicer of St. Augustine, Fla. The Hollywood Advertising Club selected two CFFP radio announcements for their International Broadcasting Award. The Advertising Association of the West gave a top award to a CFFP ballad written especially for radio in 1963, and a second place award to one of CFFP's 1964 television announcements.

Southern CFFP Program

The special fire prevention program financed by 10 Southeastern States and by the Southern Region of the Forest Service adopted new approaches to the problem of incendiarism and careless debris burning. Distribution of special radio, television, and newspaper advertisements was increased to include almost all stations and newspapers. Public consciousness of the economic loss caused by forest fires in the South is increasing. This has resulted in improved law enforcement and will ultimately bring public opinion to bear on those who set the woods on fire.

Commercial Support Increases

Fees and royalties paid in by licensed producers of educational Smokey Bear commercial items continued to rise—from $19,000 in fiscal year 1962 to more than $27,000 in fiscal year 1963. Receipts for the first half of fiscal year 1964 are more than $30,000. These funds are available for the forest fire prevention campaign under an act of Congress passed in 1952.

FOREST PEST CONTROL

Beetles and Defoliators

The largest control campaigns in more than a decade were needed to suppress destructive forest insects in 1963. A total of 1.8 million insect-infested trees, stumps, and cull logs in 17 States were treated to control bark beetles, the number one in-

sect problem. While this was substantial progress in the field of beetle suppression, serious new outbreaks of the mountain pine beetle occurred in lodgepole pine in the Teton National Forest and the Grand Teton National Park. Also, the Black Hills beetle became epidemic in ponderosa pine on the Black Hills National Forest and adjoining public and private lands. A continued large-scale control effort will be needed in 1964 to check these outbreaks.

Of the defoliating insects, the spruce budworm in Montana, Idaho, New Mexico, Minnesota, and Maine received the most attention, although the hemlock looper and the lodgepole needleminer were locally serious in Washington and in California, respectively. All together 1.7 million acres were aerially sprayed safely and effectively, but large areas infested with spruce budworm still need attention in Montana and Idaho.

Blister Rust Control

White pine blister rust control efforts dominated forest disease work again in 1963. Dwarfmistletoe surveys and suppression also received increased attention, and oak wilt control was continued. To control blister rust, 3 million acres were surveyed, ribes (the alternate host plants that spread the disease) were removed from 234,000 acres, and trees on 117,000 acres were treated with antifungal antibiotics to arrest infection. A large part of this control effort was concentrated on unprotected western white pine stands in Idaho.

Dwarfmistletoe and Oak Wilt

Dwarfmistletoe control was confined to National Forests and was accomplished mostly through timber sales and timber stand improvement. Surveys preceding such sales and improvement work covered 164,000 acres. Trees on 18,000 acres were treated to reinforce the control accomplished through sales and stand improvement.

Oak wilt control was continued as a cooperative Federal-State program in Pennsylvania, Virginia, West Virginia, Kentucky, North Carolina, and Arkansas. Aerial surveys to locate diseased trees covered 45 million acres. A total of 5,854 such trees were found and treated.

Use of Pesticides Report

In 1963 the American public was gravely concerned about pesticide use—a concern that stemmed from many sources, including the report on pesticide hazards issued by the late President Kennedy's Science Advisory Committee. Because of this concern, aerial spray projects were observed and monitored by more people than ever before in the history of forest insect control. Even under such intense scrutiny, there were no reports of damage to fish, wildlife, or other values.

The screening and testing required to find nonpersistent chemical pesticides was sharply expanded in 1963, as recommended by the President's Committee. A laboratory was set up for this purpose at the Pacific Southwest Forest and Range Experiment Station at Berkeley, Calif., using equipment and scientists transferred from other work. Other facets of control which were expanded and strengthened in 1963 were detection and evaluation. Methods and organizations for finding signs of insect and disease trouble and of assessing that trouble from the economic and biological standpoint were improved.

FLOOD PREVENTION AND RIVER BASIN PROGRAMS

The Forest Service promotes flood prevention and watershed protection under several programs: The Flood Control Act of 1944, pilot watershed projects authorized in 1954, and the Small Watershed Program under Public Law 83–566, as amended. In assisting, planning, or carrying out forestry measures under these programs, the Forest Service cooperates with local project sponsors, the Soil Conservation Service, State Foresters, and other Federal, State, and local agencies. It acts directly to apply emergency flood prevention measures on non-Federal and National Forest lands. The Forest Service also cooperates with other Federal agencies and State governments in the conduct of comprehensive river basin studies for the development of water and related land resources.

Flood Prevention Projects

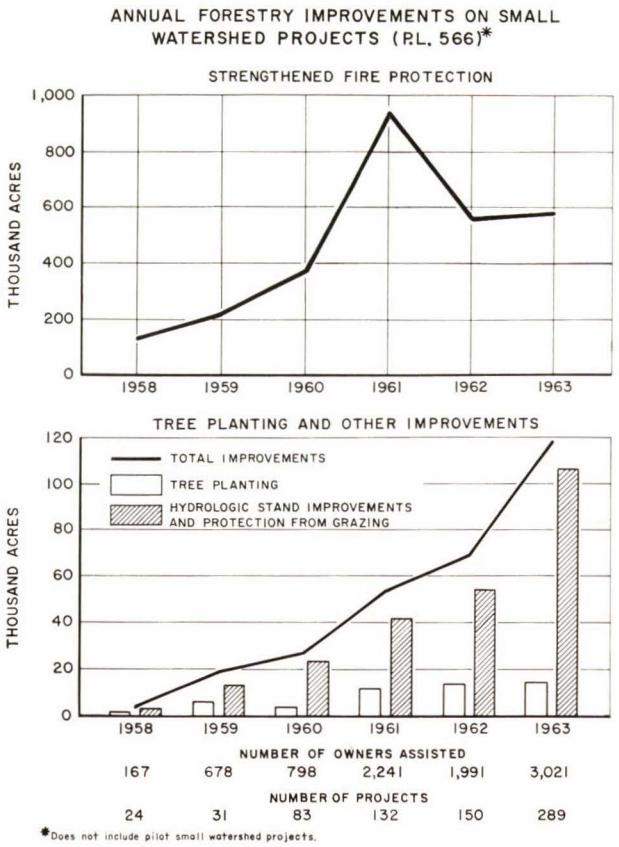
Work continued on the forestry and fire control aspects of seven flood prevention projects authorized under the Flood Control Act of 1944. During the year, 41.2 million trees were planted on eroding flood source lands. This planting, 93 percent of which was on the Yazoo-Little Tallahatchie projects in Mississippi, was done through the combined efforts of the Forest Service, Soil Conservation Service, Agricultural Stabilization and Conservation Service, Corps of Engineers, local soil and water conservation districts, and landowners.

Technical forestry assistance was given to 13,262 landowners and operators in correcting undesirable watershed conditions on private land. This action led to improved forest management on 111,210 acres and the stabilization of 15 miles of sediment-producing logging roads.

Fire prevention and control was strengthened on 2,871,000 acres of National Forest and private lands within the project areas by the construction of 50 miles of fire control roads, trails, and firebreaks, and four additional buildings for fire crews and equipment on critical watersheds.

Other flood control measures included construction of 26 channel barriers to stabilize stream channels and adjacent slopes on the Los Angeles River Project in California, and construction of 41 channel control structures—stabilizing walls, groins,

and weirs—on the North River within the George Washington National Forest, a part of the Potomac River Project in Virginia.



Pilot Projects

The Watershed Demonstration or Pilot Program on 58 small watersheds authorized in 1953 is completed except for three projects. Thirty landowners received technical forestry assistance in 1963, trees were planted on 125 acres, and 3,856 acres were put under management plans.

Public Law 566 Projects

Watershed protection and flood prevention projects are started under the Watershed Protection and Flood Prevention Program of 1954 (P.L. 566) by local sponsor groups. They receive planning, technical, and installation assistance from Federal and State agencies under the general leadership of the Soil Conservation Service.

During 1963 the Forest Service worked with State Foresters, the Soil Conservation Service, and local sponsors in planning watershed protection and flood prevention improvements on 289 small watersheds. Work plans were approved and installations authorized on 88 new projects; 55 of these include accelerated programs for improvement of forest lands.

Forestry measures were installed on 289 projects. More than 22 million trees were planted on 13,963 acres of privately owned land. Technical forestry assistance for watershed improvement was given to 3,021 landowners. Protection from forest fire was extended or strengthened on 575,000 acres. Other watershed improvements included hydrologic stand improvement and protection from grazing damage on 105,758 acres.

Public Law 566 improvements on National Forest lands included revegetation on 358 acres by grass seeding and tree planting, stabilization of 6 miles of eroding gullies, and 34 miles of roadside erosion control.

Emergency Flood Prevention

Emergency watershed treatment measures were applied on two recently burned-over areas within and adjoining the National Forests in southern California during the year. This work was done to minimize downstream hazards to life and property caused by destruction of the vegetative cover on the watersheds. About 10,688 acres were seeded to quick-growing grass by airplane or helicopter to provide an immediate protective cover over most of the burned area. The State, counties, landowners, and railroads cooperated in these efforts.

River Basin Surveys

The Forest Service cooperated with the Soil Conservation Service, the Economic Research Service, and State agencies concerned with continuing studies of water and related land resources in many river basin surveys throughout the country. These studies included cooperative surveys with the Corps of Engineers and the Bureau of Reclamation in 11 river basins; with State water resource agencies in water resource inventories and problem analyses in 7 States; and with the U.S. Study Commission for the Southeast River Basin.

At the instigation of the Bureau of the Budget, the Federal departments engaged in comprehensive river basin planning prepared for the first time a coordinated program and budget estimates encompassing their planned activities through fiscal year 1970. The Division Director, as one of the representatives of the Department of Agriculture, attended the many committee meetings and task force conferences in which these plans and estimates were developed.

Essential Support Functions

Many activities of the Forest Service are not so readily apparent as the more dramatic resource accomplishments, breakthroughs in research, or cooperative programs; yet they are essential and often the key to progress. They may be likened to a solid foundation and efficient heating, plumbing, and wiring system in a fine building.

Overall administration depends on effective planning, coordination, and direction. Essential services are provided by administrative offices at all levels of management.

Personnel workers recruit new people of high caliber, and seek to develop to maximum potential those now in the Service. They measure work standards and plan personnel needs for the future.

All aspects of financial management are handled efficiently to insure that every dollar is used where it is needed most, and where it produces results.

Resource conservation depends on public awareness and interest; therefore, information officers make facts available and tell the forestry story in order that essential work will be understood.

These and many other activities provide the foundation for the continuing effectiveness of Forest Service operations in its major responsibilities.

ADMINISTRATIVE MANAGEMENT

Finding new ways to increase efficiency enables the Forest Service to serve the American people more effectively and with greater economy. During 1963 more than 24 management studies and projects were completed and their results implemented; an additional 12 projects are under way. The Forest Service continued participation in the Department's Management Improvement Project System, whereby it reports equipment operating innovations that improve manpower utilization and agency productivity.

Accelerated Public Works

The allocation of $60.5 million to the Forest Service for accelerated public works projects in fiscal years 1963 and 1964 promoted many conservation improvements; at the same time it imposed a great burden on those charged with the administration of the program. Fortunately, earlier studies and intensive preparations made for the development program for the National Forests enabled the Forest Service to carry out APW with a minimum of overhead costs.

Volume-of-Business Study

During the year the Forest Service collected volume-of-business data from all National Forest Administration field units which will be used for revising workload allowances for each organizational unit. At regular 5-year intervals such data for all activities is collected so that the total management workload at District and Forest levels may be brought up to date.

Fire Control Management Work

A time study was made of the fire control management job at Ranger District and Supervisor Office levels. As a result, time factors for periodic workload remeasurement were redescribed, as were the changing fire control management tasks and responsibilities.

ADMINISTRATIVE SERVICES

The trend toward contracting more work continued as a means of improving manpower utilization and effecting greater economy. During the year the Forest Service handled 7,991 contracts with expenditures totaling $65,714,094. This is a new alltime high. Seventy-two percent of the expenditures were for construction, resource work, and personal and professional services, which until recent years were done mainly by Forest Service employees.

A program for decentralizing contracting to Supervisors' offices got a good start. The objective is to have more of the contracting done at the field level where it can be handled most effectively. Field specialists who will exercise increased contracting authority received intensified training at two Service-wide supply and service workshops.

In addition to the continuing work of records management, an evaluation of records that would be needed at civil defense relocation sites was made and steps were taken to insure the storage of indispensable records. Civil defense preparedness was further strengthened by equipping Forest Service fallout shelters with water, food, and first aid and sanitary equipment.

PERSONNEL MANAGEMENT

Reorganization of employment application processing improved personnel management services. This function, formerly handled by nine boards of examiners, has now been reorganized into three Forest Service Field Boards of Examiners at Atlanta, Denver, and Portland.

Significant progress has been made in improving personnel management skills on the National Forests. Personnel management staff assistants have been assigned to more than 30 percent of the National Forests. Forty-one National Forests have been authorized as appointing offices to directly handle continuing appointments.

For the first time on a nationwide basis, the Forest Service held wage board workshops to strengthen wage-setting methods for blue collar workers. The workshops were held at Pocatello, Idaho, and Russellville, Ark. They included complete training—from planning and wage surveys

to development of final wage schedules. Evaluation of results shows improved pay comparability and better relations with business firms and agencies.

Special studies of manpower use and performance were also conducted this year. In cooperation with the Department's personnel research staff, the Forest Service has conducted studies to identify the most significant aspects of managerial performance. Results will help to spot the key elements of individual performance and vital management activities.

TRAINING

Training programs in all areas continued to strengthen Forest Service administration and on-the-ground work. In an effort to improve manpower utilization and training effectiveness, the Forest Service has started a training systems program to discover and apply the most effective and economical combination of training devices, methods, and equipment to the various training programs. So far, this includes programed training texts in specialized subjects, development of the movie "Coaching on the Job," slide tape programs on technical subjects, and other miscellaneous training tools. The results of the training systems program have been an improvement in economy and in quality of Forest Service training.

The Forest Service cooperated with the Departments of Health, Education, and Welfare and Labor to promote intensive training of forestry technicians in areas of underemployment. This included planning, curriculum development, instruction, and on-the-job coaching.

Fire Generalship

A Fire Generalship School was held again this year to train top fire control men in leadership and decision making for fighting major project fires. The new fire simulator training device was used extensively in this course and in other fire training schools across the country. This device places students in stress situations where they must respond to conditions and problems resembling those faced on actual fires.

BUDGET AND FINANCE

Receipts and Expenditures

Receipts from the sale or use of National Forest resources amounted to $124,511,635 in fiscal year 1963. These receipts came from the following major sources:

Timber	$117,387,497
Grazing	3,385,978
Other	3,738,160
Total	124,511,635

The above figures include $4,341,916 received from National Forest revested Oregon and California Railroad grant lands. Resource revenue amounting to $1,712,565 was received from National Grasslands and land utilization areas administered under Title III of the Farm Tenant Act.

Other amounts received included $818,025 contributed by cooperators and timber purchasers for cooperative work on National Forest programs, $18,609,076 set aside for timber sale area improvements, $8,757,953 set aside for brush disposal, $1,489,068 from miscellaneous receipts, and $20,929 for restoration of forest lands and improvements.

Receipts and deposits from all sources totaled $155,919,251. In addition, timber purchasers built roads valued at $54,478,018 incident to timber harvest. Other agencies collected $11,671,160 for power licenses, mineral leases, and permits on National Forest land of public domain origin.

Operating expenses for National Forest programs, National Grasslands, and land utilization projects amounted to $165,361,390. Depreciation of roads, trails, and other improvements was estimated at $42,047,163.

In balance, receipts and all other credits exceeded operating expenditures and other charges by $14,659,876.

Expenditures for other Forest Service activities included $22,981,506 for cooperative State and private forestry programs, and $24,721,044 for forestry research. Cooperator contributions included in the above figures were $1,922,942 for cooperative forestry programs and $955,396 for research. The Forest Service also received $27,643 in royalties from the Smokey Bear forest fire prevention program.

Under the act of May 23, 1908, as amended, the Forest Service pays 25 percent of National Forest net receipts to States for support of schools and roads in the counties containing National Forest lands. This payment in fiscal year 1963, based on fiscal year 1962 receipts, was $27,235,140. Arizona and New Mexico school funds also received $80,462 under provisions of the act of June 20, 1910. Under the act of June 22, 1948, Minnesota received $125,432. Counties containing National Grasslands and land utilization areas received $389,506 for schools and roads from calendar year 1962 receipts under the act of July 22, 1937.

By law, the Forest Service retains 10 percent of the receipts from National Forest resources for development of National Forest roads and trails, except on revested Oregon and California Railroad grant lands. The amount retained in this fund in fiscal year 1963 was $10,900,118.

PROGRAMS AND LEGISLATION

Legislation

One of the major acts affecting the Forest Service passed during the year was the organic act for the Bureau of Outdoor Recreation. This act (P.L. 88–29) promotes coordination and development of effective programs for outdoor recreation.

In addition to appropriation acts, acts affecting the Forest Service during the 1st session of the 88th Congress included: Redesignation of the Big Hole Battlefield Monument (P.L. 88–24); assistance to States to provide additional research facilities at State agricultural stations (P.L. 88–74); extension of the boundaries of the Cache National Forest (P.L. 88–99); provision for entrance facilities to the Great Smoky Mountains National Park (P.L. 88–120); and amendment of the Alaska Statehood Act (P.L. 88–135).

The Forest Service, during the 1st session of the 88th Congress, followed on a day-to-day basis some 650 bills affecting its activities. It prepared legislative reports on 139 bills and legislative proposals; assisted in the preparation and presentation of testimony before congressional committees on 20 bills, exclusive of appropriations bills; and reviewed and commented on 92 reports on legislation prepared by other Federal agencies. Legislative drafting service was provided as requested on five proposed bills.

Program Planning

Major Forest Service programs are frequently supported by a variety of special studies that are undertaken in close coordination with other divisions and with other agencies and Departments.

One of these studies made during the calendar year sought new ways to create employment in rural areas through the improvement of forest lands. Closely related to this was an overall study of the forest resource situation in the Appalachian region, which considered forest resource action programs and proposals to help cure the area's economic ills. In addition to the above, the Forest Service was asked by the President's Appalachian Regional Commission to prepare program recommendations for timber development and for improved use and marketing of Appalachia's timber products.

The Division of Programs and Special Projects also helped to complete the Northern Great Lakes multiple use land and water study and the subsequent report, including followup activities for interagency and Departmental action. An analysis was made of the present sharing of National Forest receipts with counties and of alternate methods that would soften the impact to the counties of the sharply fluctuating 25-percent fund payments. It participated in revising and updating the Department's Land and Water Policy Guide, and in developing an improved system of land use statistics. The Division completed a report on a proposed system of National Forest Recreation Ways and the proposed National System of Scenic Roads and Parkways.

CIVIL DEFENSE

Civil defense activities were expanded and program phases strengthened to achieve improved readiness as insurance in an emergency. All activities were conducted within the framework of the national Civil Defense guidelines and the Secretary's assignment of defense responsibilities.

Among its assigned responsibilities, the Forest Service is responsible for leadership and direction of the Rural Fire Defense program covering all rural land throughout the Nation. It coordinates the efforts of all fire suppression agencies in nonurban areas to meet the mass fire situation that would follow nuclear attack.

"Rural Fire Defense—A National Plan for the Protection of Rural Areas in a Wartime Emergency" was prepared as a guide for fire control workers. It outlines the planned procedures for fire suppression in event of an enemy attack.

The Forest Service placed emphasis on training plans for rural fire control, survival, and rescue. A 3- to 5-year program was approved by the Department and Office of Civil Defense, Department of Defense, to strengthen fire protection in an area of more than 500 million acres of forest, farm, range, and other rural lands. This area is primarily in private ownership but is either not under organized protection or is receiving only token protection. Field training will be initiated through cooperative efforts of private, State, and Federal fire protection agencies early in 1964.

Of the 44 States having statewide rural fire plans, 17 updated and modernized their readiness during the past year, improving organization, equipment, and coordination features. Additional excess Federal equipment, tools, and supplies were made available to State fire protection agencies under cooperative agreements, improving their fire suppression capability. Some local volunteer fire units received this added support material when such units were a part of the State's protection organization.

Seventy-four additional radiological monitoring stations were added to the Forest Service network, bringing the total to 874. This virtually completes the network of stations at the Ranger District level. Radiological monitor training continued throughout the year, adding 785 new trained monitors, and thus bringing the total of available radiological monitors to 2,283. The Forest Service cooperated with USDA and the Civil Service Commission in providing technical personnel to orient Washington Office, USDA, and Civil Service Commission personnel on fallout hazard.

Defense-related fire research continued at a high level. One of the four projects conducted in cooperation with the Office of Civil Defense was completed and a final report was published. Progress reports were submitted for the other three and plans were made to speed the availability of further information.

The completed project provided for improved advance estimates of fire damage following nuclear attack. Such estimates required the development of a valid basis for anticipating the behavior of

mass fires caused by nuclear attack; this basis was provided by analysis of over a thousand large conflagrations. Data from this study is being combined with that from a project on fire-weather patterns to provide improved predictions of probable extent and spread of fires that might follow a nuclear attack.

A basic research project on the transfer of heat and combustion products in mass fires will produce a more complete understanding of such large-scale fires and provide more effective safeguards and countermeasures. Research in the techniques of fire detection and mapping with infrared scanning equipment is continuing. It will allow rapid post-attack reconnaissance and damage assessment regardless of smoke and haze—day or night.

In keeping with the Secretary's expressed desire and leadership in USDA employee welfare and safety, a 12-hour course in Survival Preparedness was conducted for Forest Service Washington Office personnel. This course is part of the civil defense program supervised by the District of Columbia Public Schools; sponsored by the Department of Health, Education, and Welfare; and financed by Office of Civil Defense, Department of Defense. Two hundred employees were graduated on May 1.

"Information For Emergencies" packets, originally distributed in 1960, were updated with the latest available materials, approximating 18,000 copies of various items.

Forest Service personnel served as members of Regional, State, and County USDA Defense Boards throughout the year. As requested through the Department, they also helped the Business and Defense Services Administration, Department of Commerce, in the training of executive reservists regarding timber supply in relation to lumber and paper products.

Statistical Tables

TABLE 1.—*National Forest and other lands administered by the Forest Service, as of June 30, 1963*

State and Commonwealth	National Forest [1]	National Grassland	Land utilization projects	Total
	Acres	*Acres*	*Acres*	*Acres*
Alabama	631, 558	0	0	631, 558
Alaska	20, 741, 974	0	0	20, 741, 974
Arizona	11, 403, 716	0	0	11, 403, 716
Arkansas	2, 413, 365	0	0	2, 413, 365
California	19, 946, 565	0	19, 115	19, 965, 680
Colorado	13, 712, 352	612, 036	560	14, 324, 948
Florida	1, 074, 948	0	0	1, 074, 948
Georgia	777, 347	0	9, 340	786, 687
Idaho	20, 298, 292	47, 599	0	20, 345, 891
Illinois	211, 151	0	0	211, 151
Indiana	121, 020	0	3, 180	124, 200
Iowa	4, 649	0	360	5, 009
Kansas	0	107, 114	0	107, 114
Kentucky	460, 160	0	0	460, 160
Louisiana	591, 564	0	0	591, 564
Maine	49, 556	0	465	50, 021
Massachusetts	1, 651	0	0	1, 651
Michigan	2, 563, 730	0	6, 695	2, 570, 425
Minnesota	2, 767, 890	0	0	2, 767, 890
Mississippi	1, 133, 982	0	0	1, 133, 982
Missouri	1, 360, 345	0	12, 938	1, 373, 283
Montana	16, 635, 605	0	0	16, 635, 605
Nebraska	245, 409	94, 307	0	339, 716
Nevada	5, 058, 020	0	0	5, 058, 020
New Hampshire	678, 104	0	0	678, 104
New Mexico	8, 823, 147	133, 904	89, 889	9, 046, 940
New York	0	0	13, 747	13, 747
North Carolina	1, 123, 741	0	0	1, 123, 741
North Dakota	520	1, 104, 330	0	1, 104, 850
Ohio	109, 796	0	0	109, 796
Oklahoma	224, 790	46, 211	0	271, 001
Oregon	15, 359, 259	102, 920	0	15, 462, 179
Pennsylvania	471, 081	0	0	471, 081
South Carolina	587, 289	0	0	587, 289
South Dakota	1, 121, 150	864, 520	2, 885	1, 988, 555
Tennessee	597, 010	0	1, 212	598, 222
Texas	657, 997	117, 269	0	775, 266
Utah	7, 935, 995	0	0	7, 935, 995
Vermont	232, 134	0	0	232, 134
Virginia	1, 451, 233	0	0	1, 451, 233
Washington	9, 688, 357	0	0	9, 688, 357
West Virginia	905, 353	0	0	905, 353
Wisconsin	1, 467, 799	0	1, 130	1, 468, 929
Wyoming	8, 570, 623	573, 167	0	9, 143, 790
Puerto Rico	27, 889	0	27	27, 916
Virgin Islands	147	0	0	147
Total	182, 238, 263	3, 803, 377	161, 543	186, 203, 183

[1] This column includes all lands administered by the Forest Service, except National Grasslands and Land Utilization Project Lands which are shown separately.

TABLE 2.—*Area of commercial timberland and volume of timber in the National Forests, January 1, 1964*

State [1]	Unreserved commercial forest land	Sawtimber			Other products [2]	All products	
		Cubic feet	Local scale	Converted to International ¼-inch rule		Cubic feet	Local log scale [3]
	Thousand acres	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million cubic feet*	*Million cubic feet*	*Million board feet*
Alabama	617.5	372.9	1,649.6	1,890.4	138.3	511.2	2,341.1
Alaska	5,305.5	29,186.8	157,280.0	171,435.2	3,203.9	32,390.7	173,299.5
Arizona	2,866.6	2,608.7	14,612.5	16,804.4	646.7	3,255.4	17,846.0
Arkansas	2,546.9	1,092.1	4,824.4	5,528.8	493.9	1,586.0	7,293.9
California	8,215.8	27,147.1	150,864.0	159,915.8	1,478.4	28,625.5	158,256.0
Colorado	8,375.1	8,898.7	36,663.0	43,629.0	5,296.3	14,195.0	63,144.5
Florida	919.7	313.8	1,384.6	1,586.7	261.4	575.2	2,691.6
Georgia	745.7	515.5	2,216.1	2,539.6	219.7	735.2	3,314.6
Idaho	12,197.6	15,538.6	77,279.9	89,737.2	3,901.4	19,440.0	96,786.9
Illinois	187.8	51.0	318.8	366.6	70.3	121.3	670.3
Indiana	112.0	26.1	162.1	186.4	33.8	59.9	331.1
Kentucky	440.9	208.5	1,272.1	1,272.1	252.5	461.0	2,534.6
Louisiana	557.8	347.2	1,544.2	1,769.6	118.7	465.9	2,137.7
Maine	36.9	23.4	127.1	127.1	37.0	60.4	312.1
Michigan	2,415.0	263.9	1,649.8	1,897.2	862.6	1,126.5	5,962.8
Minnesota	2,062.9	115.3	720.4	828.5	1,512.7	1,628.0	8,283.9
Mississippi	1,107.3	730.3	3,256.0	3,731.4	248.9	979.2	4,500.5
Missouri	1,311.7	207.8	1,298.8	1,493.6	400.8	608.6	3,302.8
Montana	10,325.0	10,541.9	50,002.7	58,503.1	7,604.1	18,146.0	88,023.2
Nebraska	21.0	11.6	48.6	57.8	3.4	15.0	65.6
Nevada	198.0	633.9	2,643.9	3,040.5	23.0	656.9	2,758.9
New Hampshire	568.1	310.6	1,689.5	1,689.5	491.3	801.9	4,146.0
New Mexico	3,009.0	1,743.2	9,762.1	11,226.4	704.4	2,447.6	13,284.1
North Carolina	963.4	527.9	2,279.3	2,612.1	171.3	699.2	3,135.8
Ohio	87.9	23.3	144.7	166.4	31.5	54.8	302.2
Oregon	12,896.6	44,060.5	243,793.5	305,495.8	9,934.4	53,994.9	293,465.5
Pennsylvania	451.1	173.1	1,056.2	1,056.2	414.9	588.0	3,130.7
South Carolina	543.2	387.3	1,699.9	1,948.1	98.6	485.9	2,192.9
South Dakota	960.3	533.3	2,248.2	2,675.3	245.7	779.0	3,476.7
Tennessee	572.2	303.5	1,320.7	1,513.5	157.9	461.4	2,110.2
Texas	620.8	598.0	2,719.7	3,116.8	177.2	775.2	3,605.7
Utah	2,830.9	2,341.7	11,335.4	13,096.4	981.6	3,323.3	16,243.4
Vermont	224.1	150.0	945.2	945.2	175.6	325.6	1,823.2
Virginia	1,182.0	442.0	2,262.0	2,262.0	708.4	1,150.4	5,804.0
Washington	5,244.3	20,497.5	115,778.5	145,927.2	5,266.4	25,763.9	142,110.5
West Virginia	751.4	344.5	1,481.6	1,481.6	331.6	676.1	3,139.6
Wisconsin	1,366.2	140.3	876.2	1,007.6	553.1	693.4	3,641.7
Wyoming	3,158.7	3,202.6	14,208.8	16,691.6	2,212.8	5,415.4	25,272.8
Total	95,996.9	174,614.4	923,420.1	1,079,252.7	49,464.5	224,078.9	1,170,742.6

[1] Areas and volumes are assigned to States of principal forest locations. Minor areas and volumes in adjoining States are ignored.

[2] Includes material mainly of less than saw-log size.

[3] These totals include material in trees too small to produce boards but are shown converted to board feet at the rate of 1 cubic foot=5 board feet to provide comparative figures in units which are customarily used and understood.

TABLE 3.—*Volume and value of timber cut from National Forests, timber stand improvement, and area planted and seeded to trees, fiscal year 1963*

State and Commonwealth	Timber cut		Timber stand improvement,[1] fiscal year 1963	Area planted and seeded to trees	
	Volume	Value		Fiscal year 1963	Total planted and seeded through June 30, 1963
	Thousand board feet	*Dollars*	*Acres*	*Acres*	*Acres*
Alabama	57,241	1,223,897	10,100	6,974	74,308
Alaska	377,540	926,616	636	235	4,662
Arizona	298,545	1,591,728	18,218	896	5,457
Arkansas	158,037	3,861,504	60,366	10,277	53,503
California	1,444,434	16,650,255	20,863	25,892	160,085
Colorado	167,094	755,594	8,480	4,788	81,442
Florida	66,603	1,036,003	2,152	2,580	57,179
Georgia	42,582	1,013,624	18,116	4,476	46,340
Idaho	753,508	6,000,998	10,491	12,359	144,003
Illinois	7,050	68,397	3,573	1,020	47,063
Indiana	5,095	51,189	8,153	1,543	25,571
Iowa	119	250	0	0	60
Kentucky	20,616	304,590	31,718	251	2,271
Louisiana	69,180	1,236,930	17,590	7,311	153,409
Maine	1,141	19,249	3,384	0	67
Michigan	139,213	952,369	48,794	15,649	618,566
Minnesota	123,800	732,237	41,765	10,760	177,702
Mississippi	143,027	2,654,481	45,406	12,247	220,050
Missouri	38,659	401,564	26,085	7,246	88,032
Montana	705,655	4,901,628	11,937	6,710	64,305
Nebraska	833	1,742	163	503	30,838
Nevada	582	2,283	0	0	506
New Hampshire	19,084	245,104	8,762	0	1,172
New Mexico	104,959	434,029	11,735	459	4,479
New York	47	258	0	0	42
North Carolina	46,052	660,424	6,599	3,719	29,529
North Dakota	65	631	0	0	967
Ohio	3,821	32,095	5,634	905	20,083
Oklahoma	7,522	158,397	11,209	1,202	8,208
Oregon	3,143,091	59,525,057	29,398	49,550	352,891
Pennsylvania	29,670	875,282	14,433	190	19,350
Puerto Rico	12	413			
South Carolina	95,918	1,982,890	9,100	2,667	25,276
South Dakota	40,038	297,871	6,121	941	41,380
Tennessee	24,321	373,069	7,165	937	9,629
Texas	83,382	1,579,085	18,170	1,391	56,142
Utah	64,093	348,160	2,652	208	5,997
Vermont	8,820	201,070	5,478	0	1,430
Virginia	42,154	275,209	15,226	530	6,667
Washington	1,507,813	21,624,777	10,585	19,335	238,502
West Virginia	29,403	499,257	22,795	679	18,366
Wisconsin	68,205	466,302	19,945	5,844	242,585
Wyoming	87,218	439,262	4,463	920	9,680
Total	10,026,242	134,405,770	597,460	221,194	3,147,794

[1] Includes release, weeding, thinning, and pruning only.

TABLE 4.—*Number of livestock permitted to graze on the National Forests, National Grasslands, and land utilization projects, calendar year 1963*

NATIONAL FORESTS

State	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock permitted to graze	Paid permits	Livestock permitted to graze
	Number	*Number*	*Number*	*Number*
Alabama	37	645	0	0
Alaska	2	63	1	10
Arizona	844	141, 489	17	57, 121
Arkansas	95	1, 616	0	0
California	1, 079	105, 834	53	83, 754
Colorado	1, 624	150, 119	378	464, 787
Florida	18	1, 152	0	0
Georgia	44	752	0	0
Idaho	1, 811	126, 838	286	484, 516
Illinois	6	63	0	0
Indiana	2	7	0	0
Iowa	5	119	0	0
Louisiana	70	1, 705	0	0
Michigan	20	294	0	0
Minnesota	9	125	1	18
Mississippi	62	1, 093	0	0
Missouri	183	1, 658	0	0
Montana	1, 681	119, 292	114	142, 479
Nebraska	107	13, 959	0	0
Nevada	264	54, 345	34	105, 527
New Mexico	1, 675	85, 346	98	57, 628
North Carolina	0	42	0	0
Ohio	8	10	0	0
Oklahoma	13	355	0	0
Oregon	850	84, 741	66	94, 544
South Carolina	20	408	0	0
South Dakota	518	20, 538	13	9, 089
Tennessee	6	93	0	0
Texas	182	4, 950	0	0
Utah	2, 281	100, 012	544	398, 647
Vermont	2	15	0	0
Virginia	12	69	1	40
Washington	397	30, 611	15	17, 833
West Virginia	51	525	14	249
Wisconsin	8	189	0	0
Wyoming	1, 039	116, 655	185	316, 234
Total	15, 025	1, 165, 727	1, 820	2, 232, 476

NATIONAL GRASSLANDS

State	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock permitted to graze	Paid permits	Livestock permitted to graze
	Number	*Number*	*Number*	*Number*
Colorado	325	20, 763	0	0
Idaho	74	2, 551	0	0
Kansas	124	3, 717	0	0
Nebraska	47	5, 336	5	2, 067
New Mexico	89	4, 876	0	0
North Dakota	649	60, 907	9	3, 135
Oklahoma	122	2, 826	0	0
Oregon	63	3, 162	3	4, 317
South Dakota	487	43, 629	29	12, 092
Texas	172	6, 005	0	0
Wyoming	170	14, 248	69	25, 495
Total	2, 322	168, 020	115	47, 106

LAND UTILIZATION PROJECTS

State	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock permitted to graze	Paid permits	Livestock permitted to graze
	Number	*Number*	*Number*	*Number*
California	19	670	0	0
Colorado	2	0	0	0
Iowa	1	41	0	52
Missouri	53	1, 077	0	0
New Mexico	36	820	0	0
New York	140	2, 205	2	152
South Dakota	2	234	0	0
Total	253	5, 047	2	204

TABLE 5.—*Estimated legal harvest of big-game animals* [1] *on National Forests and National Grasslands, fiscal year 1963*

State	Deer	Elk	Bear	Bighorn	Total big game [2]
	Number	*Number*	*Number*	*Number*	*Number*
Alabama	1, 300				1, 300
Alaska	12, 000	120	700	25	14, 000
Arizona	23, 000	860	160		27, 000
Arkansas	4, 400				4, 400
California	27, 000		640		28, 000
Colorado	82, 000	11, 000	540	90	94, 000
Florida	1, 600		20		1, 600
Georgia	1, 600				1, 600
Idaho	46, 000	11, 000	1, 700	100	60, 000
Illinois	3, 100				3, 100
Indiana	320				320
Kentucky	240				240
Louisiana	1, 300				1, 300
Maine	90		10		100
Michigan	20, 000		370		20, 000
Minnesota	13, 000		270		13, 000
Mississippi	2, 400				2, 400
Missouri	3, 400				3, 400
Montana	54, 000	9, 100	1, 300	100	67, 000
Nebraska	360				660
Nevada	14, 000	5		5	14, 000
New Hampshire	700		50		750
New Mexico	15, 000	700	140		16, 000
North Carolina	2, 700		150		3, 000
North Dakota	5, 100				6, 600
Ohio	170				170
Oklahoma	180				180
Oregon	66, 000	8, 200	880		75, 000
Pennsylvania	4, 000		50		4, 100
South Carolina	570		5		570
South Dakota	11, 200				13, 000
Tennessee	860		25		970
Texas	640				650
Utah	95, 000	1, 100	60		96, 000
Vermont	600		50		650
Virginia	8, 700		200		8, 900
Washington	20, 000	5, 000	1, 500		27, 000
West Virginia	1, 100		60		1, 200
Wisconsin	3, 800		160		4, 000
Wyoming	37, 000	6, 000	200	100	48, 000

[1] Figures rounded in posting and totals.
[2] Also includes antelope, moose, mountain goat, peccary, and wild boar.

TABLE 6.—*Construction, reconstruction, and maintenance of National Forest (forest development) roads, bridges, and trails, fiscal year 1963*

State and Commonwealth	Roads		Bridges: construction, reconstruction, and replacement	Trails		Total obligations from all funds including APW [1]
	Construction and reconstruction	Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Number*	*Miles*	*Miles*	*Dollars*
Alabama	9.3	1,530.9	6	0.0	0.0	423,251
Alaska	15.7	294.4	1	1.2	471.1	2,266,329
Arizona	63.4	10,212.4	1	6.4	3,725.4	1,779,519
Arkansas	18.3	4,495.3	4	0	0	808,841
California	94.5	30,451.3	9	25.5	14,928.9	12,440,809
Colorado	142.2	14,237.0	13	15.0	9,138.6	3,025,516
Florida	26.2	1,474.1	10	0	0	502,425
Georgia	33.5	2,736.6	0	0	182.6	674,301
Idaho	127.3	16,269.6	54	84.7	19,713.8	7,170,403
Illinois	10.4	938.4	0	25.0	24.5	330,306
Indiana	5.3	473.1	0	0	0	97,362
Kentucky	24.0	1,278.2	0	76.5	57.3	593,062
Louisiana	25.3	1,367.7	27	0	0	415,367
Maine	1.1	51.8	0	0	85.4	16,748
Michigan	191.0	5,920.8	4	0	0	1,838,013
Minnesota	54.6	3,036.8	2	0	467.9	2,326,349
Mississippi	12.2	2,569.4	30	0	0	877,208
Missouri	37.2	2,438.7	0	0	0	446,990
Montana	77.7	12,649.0	28	68.6	15,394.5	6,039,537
Nebraska	5.7	266.9	0	0	0	107,062
Nevada	10.0	2,979.2	3	0	1,912.6	289,267
New Hampshire	10.1	239.9	1	1.5	1,000.6	342,019
New Mexico	54.6	7,497.9	3	21.4	3,745.3	1,891,292
North Carolina	21.7	2,824.5	7	3.0	1,207.6	782,877
North Dakota	0	.3	0	0	0	0
Ohio	1.1	272.7	0	0	0	50,467
Oklahoma	27.0	482.9	0	0	0	148,110
Oregon	98.3	24,684.3	25	73.9	9,239.1	11,575,186
Pennsylvania	39.7	641.9	2	0	167.4	478,679
Puerto Rico	1.7	23.1	0	.5	39.4	290,092
South Carolina	19.2	1,820.4	3	0	0	421,363
South Dakota	5.4	1,770.2	4	0	10.3	270,263
Tennessee	21.5	1,135.3	2	0	500.8	724,436
Texas	70.4	1,641.2	0	0	0	787,578
Utah	153.1	5,847.8	14	29.0	6,564.2	2,281,399
Vermont	2.2	246.8	1	0	185.5	210,849
Virginia	25.7	1,722.1	1	0	862.0	660,329
Washington	87.4	9,670.0	23	36.1	8,403.4	5,881,373
West Virginia	68.2	1,413.6	3	24.9	742.6	1,269,975
Wisconsin	89.5	2,771.4	1	0	0	1,319,973
Wyoming	79.2	5,863.5	7	50.5	5,751.3	1,307,321
District of Columbia [2]						811,977
Total	1,860.9	186,241.4	289	543.7	104,522.1	73,974,223

[1] Total obligations are for construction, reconstruction, and maintenance.
[2] Administrative expenses.

TABLE 7.—*Use of recreation resources on the National Forests, calendar year 1963*

State and Commonwealth	Number of visits to—								
	Campgrounds	Picnic sites	Winter sports sites	Organization camps	Hotels or resorts	Recreation residences	Wilderness areas[1]	Other forest areas	All facilities and areas
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Alabama	37. 7	131. 1	0. 0	1. 5	0. 0	0. 0	0. 0	132. 8	303. 1
Alaska	45. 1	96. 0	58. 0	1. 8	99. 3	16. 8	0	888. 0	1, 205. 0
Arizona	1, 032. 8	2, 372. 1	135. 2	58. 8	328. 1	61. 5	14. 5	3, 454. 0	7, 457. 0
Arkansas	101. 0	539. 9	0	5. 2	85. 1	9. 0	0	1, 510. 5	2, 250. 7
California	2, 565. 9	1, 778. 8	2, 028. 5	330. 0	1, 819. 3	682. 1	289. 6	8, 174. 9	17, 669. 1
Colorado	1, 351. 0	1, 301. 1	702. 5	22. 6	219. 5	50. 1	46. 9	8, 766. 2	12, 459. 9
Florida	270. 4	565. 9	0	13. 6	1. 7	25. 6	0	1, 083. 4	1, 960. 6
Georgia	142. 8	456. 8	0	2. 2	5. 0	3. 0	0	1, 228. 0	1, 837. 8
Idaho	834. 7	389. 8	225. 5	32. 3	172. 5	51. 5	59. 9	2, 795. 1	4, 561. 3
Illinois	5. 0	117. 4	0	0	0	0	0	538. 5	660. 9
Indiana	. 8	15. 3	0	0	0	0	0	145. 6	161. 7
Kansas	0	5. 0	0	0	0	0	0	3. 6	8. 6
Kentucky	20. 9	205. 0	0	2. 0	34. 0	1. 2	0	723. 2	986. 3
Louisiana	48. 5	278. 8	0	22. 1	40. 3	23. 0	0	160. 9	573. 6
Maine	1. 7	15. 5	0	. 2	0	0	0	27. 9	45. 3
Michigan	127. 5	224. 1	347. 3	5. 4	6. 9	11. 5	0	3, 831. 2	4, 553. 9
Minnesota	177. 3	82. 0	27. 0	8. 3	40. 5	13. 3	228. 5	1, 186. 9	1, 763. 8
Mississippi	20. 4	319. 7	0	10. 4	15. 4	0	0	486. 0	851. 9
Missouri	23. 6	186. 9	0	. 7	0	0	0	1, 181. 1	1, 392. 3
Montana	421. 8	579. 5	254. 1	19. 8	85. 6	73. 9	42. 5	5, 177. 2	6, 654. 4
Nebraska	20. 5	41. 6	0	5. 4	0	0	0	224. 0	291. 5
Nevada	169. 9	338. 5	32. 8	9. 4	0	2. 7	. 7	262. 6	816. 6
New Hampshire	107. 0	545. 9	224. 2	1. 2	81. 1	0	5. 0	2, 628. 6	3, 593. 0
New Mexico	598. 1	1, 618. 4	220. 6	31. 3	43. 4	18. 9	62. 1	2, 347. 3	4, 940. 1
North Carolina	65. 5	795. 7	0	12. 0	14. 2	3. 7	3. 0	3, 194. 7	4, 088. 8
North Dakota	1. 0	6. 0	0	0	0	0	0	114. 8	121. 8
Ohio	6. 5	66. 7	0	0	0	0	0	107. 6	180. 8
Oklahoma	9. 6	139. 0	0	0	0	0	0	72. 5	221. 1
Oregon	1, 370. 0	1, 160. 6	503. 9	166. 0	1, 129. 1	56. 0	61. 4	3, 687. 2	8, 134. 2
Pennsylvania	50. 5	251. 3	0	22. 3	0	24. 3	0	1, 197. 4	1, 545. 8
South Carolina	11. 6	251. 6	0	0	0	0	0	497. 3	760. 5
South Dakota	486. 3	1, 096. 8	8. 8	78. 6	20. 2	18. 5	0	2, 116. 1	3, 825. 3
Tennessee	198. 6	825. 4	0	18. 9	56. 4	25. 7	0	1, 222. 8	2, 347. 8
Texas	96. 8	386. 3	0	4. 3	1. 1	0	0	521. 4	1, 009. 9
Utah	1, 499. 2	2, 617. 9	662. 0	68. 7	75. 6	64. 8	45. 4	3, 847. 9	8, 881. 5
Vermont	5. 5	49. 3	445. 0	0	0	0	0	281. 7	781. 5
Virginia	65. 7	293. 7	0	6. 3	0	1. 4	0	2, 857. 6	3, 224. 7
Washington	907. 3	369. 3	676. 3	40. 8	231. 3	61. 3	26. 4	1, 784. 7	4, 097. 4
West Virginia	42. 3	162. 4	0	9. 0	0	0	0	919. 4	1, 133. 1
Wisconsin	49. 6	160. 6	21. 3	1. 8	. 4	2. 8	0	545. 6	782. 1
Wyoming	572. 1	447. 8	104. 6	21. 8	215. 0	40. 4	51. 2	2, 553. 5	4, 006. 4
Puerto Rico	0	289. 9	0	7. 2	96. 0	4. 9	0	42. 9	440. 9
Total	13, 562. 5	21, 575. 4	6, 667. 6	1, 041. 9	4, 917. 0	1, 347. 9	937. 1	72, 522. 6	122, 582. 0

[1] Includes wilderness, wild, primitive, and canoe areas.

TABLE 8.—*Recreation sites and capacities on the National Forests and National Grasslands as of June 30, 1963*

Type of facility	Sites classed according to number of annual visits						Area	Normal capacity (persons at one time)	Number of family units			
	Under 1,000	1,000 to 5,000	5,000 to 15,000	15,000 to 25,000	Over 25,000	Total			Camping	Trailer	Picnicking	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Acres*	*Number*	*Number*	*Number*	*Number*	*Number*
Campground	2,409	1,384	584	137	93	4,607	27,248	268,602	39,608	5,817	6,174	51,599
Picnic site	387	483	287	95	119	1,371	6,791	86,352	1,232	93	14,815	16,140
Subtotal	2,796	1,867	871	232	212	5,978	34,039	354,954	40,840	5,910	20,989	67,739
Organization camp	252	267	48	2	0	569	7,534	72,013				
Hotel, lodge, and resort	117	154	86	21	30	408	3,193	51,021				
Other public service	58	43	35	10	22	168	874	17,610				
Recreation residence	1,227	258	63	10	4	1,562	17,377	104,005	------	------	------	[1] 18,266
Swimming site	29	68	70	26	26	219	508	37,983				
Boating site	175	177	81	8	8	449	778	33,906				
Winter sports site	38	41	38	17	53	187	34,797	216,371				
Observation site	88	75	41	18	48	270	473	14,678				
Total	4,780	2,950	1,333	344	403	9,810	99,573	902,541				

[1] Number of residences.

TABLE 9.—*Fires controlled by Forest Service organizations to protect National Forest lands, and area burned, calendar year 1963*

State	Number of fires						Area burned (acres)	
	Lightning	Smoking	Recreation	Incendiary	Other	Total	National Forest	Other ownership
Alabama	5	49	28	40	56	178	745	1,786
Alaska	0	2	12	1	10	25	68	2
Arizona	807	69	68	3	89	1,036	2,789	56
Arkansas	70	79	69	165	128	511	17,040	5,162
California	672	205	91	48	353	1,369	9,007	191
Colorado	243	41	89	4	62	439	4,258	710
Florida	94	35	12	35	46	222	1,069	51
Georgia	10	28	20	13	25	96	778	227
Idaho	1,391	61	53	3	79	1,587	3,774	590
Illinois	2	17	2	9	23	53	223	599
Indiana	0	9	4	12	16	41	52	223
Kansas	2	0	0	0	1	3	6,625	260
Kentucky	7	36	11	31	41	126	1,743	312
Louisiana	9	30	19	93	36	187	3,806	1,162
Michigan	8	68	30	3	92	201	370	420
Minnesota	2	16	33	9	31	91	242	381
Mississippi	5	79	50	215	141	490	2,385	1,428
Missouri	13	83	106	160	110	472	1,889	1,824
Montana	694	41	49	6	80	870	2,458	680
Nebraska	28	0	0	0	0	28	2,366	34
Nevada	20	2	4	0	5	31	2,822	235
New Hampshire	8	3	2	0	3	16	43	8
New Mexico	626	31	31	4	28	720	1,550	338
North Carolina	7	39	24	76	61	207	2,792	2,598
North Dakota	0	1	1	0	0	2	9	0
Ohio	0	42	6	87	56	191	250	676
Oklahoma	7	20	8	102	41	178	5,097	3,039
Oregon	834	79	135	11	132	1,191	2,090	789
Pennsylvania	0	2	8	3	5	18	65	5
South Carolina	6	43	8	69	65	191	2,147	1,359
South Dakota	90	0	3	0	22	115	631	87
Tennessee	5	21	23	92	57	198	4,576	1,793
Texas	10	27	28	34	48	147	1,505	539
Utah	152	23	40	11	38	264	2,167	787
Vermont	2	0	4	0	8	14	0	2
Virginia	12	62	25	55	100	254	2,839	2,179
Washington	501	44	96	1	89	731	481	3,963
West Virginia	2	8	4	6	12	32	34	36
Wisconsin	3	11	7	4	18	43	91	33
Wyoming	124	19	21	0	8	172	1,367	764
Total	6,471	1,425	1,224	1,405	2,215	12,740	92,243	35,328

TABLE 10.—*Forest fires on protected State and private lands, and area burned, calendar year 1963, and expenditures for control, fiscal year 1963*

State	Area protected	Fires	Area burned	Prevention and suppression expenditures			
				Federal	State and county	Private [1]	Total
	Thousand acres	*Number*	*Acres*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	19, 990	10, 738	290, 908	404, 400	973, 375	161, 171	1, 538, 946
Alaska	9, 250	68	1, 055	47, 000	188, 569		235, 569
Arkansas	16, 535	7, 622	345, 857	350, 800	1, 017, 518	86, 255	1, 454, 573
California	19, 810	1, 866	17, 549	1, 152, 300	16, 537, 366		17, 689, 666
Colorado	7, 407	440	7, 480	48, 750	123, 891		172, 641
Connecticut	1, 989	873	3, 708	57, 500	311, 514		369, 014
Delaware	453	112	535	12, 500	15, 264		27, 764
Florida	18, 250	7, 016	94, 759	582, 500	3, 089, 947	141, 494	3, 813, 941
Georgia	23, 676	10, 498	61, 716	564, 200	2, 962, 759	72, 705	3, 599, 664
Hawaii	1, 152	7	5, 783	25, 000	33, 065		58, 065
Idaho	7, 343	970	85, 558	197, 500	345, 926	103, 630	647, 056
Illinois	3, 170	724	16, 063	71, 500	135, 888		207, 388
Indiana	3, 931	630	14, 232	53, 700	114, 825		168, 525
Iowa	2, 277	75	2, 278	47, 000	81, 328		128, 328
Kansas	220	9	1, 542	8, 908	8, 908		17, 816
Kentucky	9, 854	4, 579	306, 253	228, 900	791, 423		1, 020, 323
Louisiana	11, 899	10, 010	140, 885	461, 300	1, 686, 859	17, 800	2, 165, 959
Maine	16, 973	544	1, 808	327, 200	981, 953		1, 309, 153
Maryland	2, 850	984	9, 758	156, 200	451, 061		607, 261
Massachusetts	3, 252	12, 727	19, 114	132, 800	387, 369		520, 169
Michigan	17, 205	1, 347	9, 697	486, 200	1, 964, 735		2, 450, 935
Minnesota	17, 771	962	26, 740	314, 800	751, 900		1, 066, 700
Mississippi	14, 576	14, 916	236, 734	475, 200	1, 868, 567		2, 343, 767
Missouri	11, 016	4, 286	71, 469	270, 900	823, 679		1, 094, 579
Montana	6, 915	408	1, 737	143, 200	99, 648	273, 281	516, 129
Nebraska	2, 360	132	4, 418	11, 425	15, 909		27, 334
Nevada	2, 216	117	356	51, 400	128, 270	121, 745	301, 415
New Hampshire	4, 182	865	2, 236	89, 200	233, 233	6, 400	328, 833
New Jersey	2, 095	2, 102	202, 116	134, 800	503, 717		638, 517
New Mexico	1, 998	105	1, 487	49, 000	73, 402	18, 969	141, 371
New York	12, 995	1, 429	12, 405	301, 200	828, 397		1, 129, 597
North Carolina	17, 279	4, 783	277, 136	421, 900	1, 565, 839	25, 261	2, 013, 000
North Dakota	116	4	89	9, 000	9, 234		18, 234
Ohio	3, 923	1, 668	9, 066	124, 100	322, 755		446, 855
Oklahoma	4, 488	2, 170	168, 509	175, 900	184, 914	18, 514	379, 328
Oregon	12, 141	950	6, 400	560, 800	2, 060, 098	376, 758	2, 997, 656
Pennsylvania	14, 704	2, 643	44, 375	247, 300	1, 159, 609		1, 406, 909
Rhode Island	434	150	1, 166	48, 000	118, 797		166, 797
South Carolina	11, 175	5, 595	73, 795	391, 800	1, 408, 155		1, 799, 955
South Dakota	2, 827	68	199	47, 000	65, 832		112, 832
Tennessee	11, 800	5, 100	89, 814	337, 800	1, 153, 148	5, 381	1, 496, 329
Texas	14, 884	4, 144	134, 450	351, 300	744, 675	124, 775	1, 220, 750
Utah	5, 944	288	27, 803	49, 000	117, 491		166, 491
Vermont	3, 517	249	450	47, 000	55, 545		102, 545
Virginia	14, 033	3, 300	44, 824	360, 300	1, 150, 021	5, 496	1, 515, 817
Washington	12, 280	1, 101	9, 216	558, 700	2, 890, 095	50, 000	3, 498, 795
West Virginia	9, 007	2, 836	214, 370	163, 600	366, 697		530, 297
Wisconsin	15, 297	2, 156	8, 881	440, 100	1, 641, 810		2, 081, 910
Wyoming	3, 875	61	1, 051	41, 383	41, 385		82, 768
Total	431, 334	134, 427	3, 107, 830	11, 632, 266	52, 586, 365	1, 609, 635	65, 828, 266

[1] Private expenditures, spent under direct supervision of State Foresters, as part of the Clarke-McNary program.

TABLE 11.—*Distribution of forest and windbarrier planting stock by cooperating States, fiscal year 1963 (under Clarke-McNary program)*

State and Commonwealth	Expenditures derived from—				Trees distributed (fiscal year 1963)
	Federal allotment	State appropriation	Receipts	All sources	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Number*
Alabama	3,000	35,584	136,020	174,604	43,829,000
Alaska	0	0	0	0	0
Arizona	0	0	0	0	0
Arkansas	4,000	48,803	42,189	94,992	9,160,000
California	5,850	59,727	32,742	98,319	2,804,000
Colorado	12,000	13,559	34,999	60,558	506,000
Connecticut	4,000	18,208	22,066	44,274	1,374,000
Delaware	3,000	13,706	0	16,706	838,000
Florida	4,000	49,564	277,460	331,024	61,222,000
Georgia	4,000	184,912	191,367	380,279	51,008,000
Hawaii	5,850	74,112	0	79,962	1,241,000
Idaho	10,500	12,210	13,670	36,380	514,000
Illinois	5,000	51,345	55,267	111,612	4,448,000
Indiana	4,500	80,944	76,813	162,257	4,563,000
Iowa	0	0	39,149	39,149	1,420,000
Kansas	10,136	10,136	36,992	57,264	961,000
Kentucky	3,000	166,341	78,431	247,772	14,900,000
Louisiana	3,000	56,215	129,703	188,918	29,769,000
Maine	4,000	36,229	30,200	70,429	2,037,000
Maryland	3,000	37,716	8,151	48,867	5,578,000
Massachusetts	3,000	25,139	10,624	38,763	507,000
Michigan	5,000	29,568	68,627	103,195	15,472,000
Minnesota	6,000	316,869	118,269	441,138	35,048,000
Mississippi	3,000	9,838	186,279	199,117	44,508,000
Missouri	6,453	80,862	27,016	114,331	5,743,000
Montana	11,000	14,602	38,385	63,987	1,006,000
Nebraska	0	1,750	92,297	94,047	2,241,000
Nevada	6,233	6,233	5,542	18,008	58,000
New Hampshire	3,000	21,489	10,599	35,088	1,170,000
New Jersey	4,000	11,841	10,377	26,218	651,000
New Mexico	5,000	7,131	5,030	17,161	153,000
New York	3,000	285,356	154,430	442,786	22,143,000
North Carolina	0	0	208,688	208,688	29,402,000
North Dakota	12,000	16,312	48,282	76,594	1,172,000
Ohio	3,000	112,922	116,173	232,095	11,923,000
Oklahoma	13,000	26,181	6,324	45,505	953,000
Oregon	3,000	22,850	111,443	137,293	10,963,000
Pennsylvania	3,000	212,520	79,094	294,614	13,684,000
Puerto Rico	3,000	57,337	0	60,337	1,267,000
Rhode Island	2,875	2,875	3,285	9,035	299,000
South Carolina	3,000	144,795	166,381	314,176	51,959,000
South Dakota	12,000	12,642	105,666	130,308	2,345,000
Tennessee	3,000	3,123	77,939	84,062	25,323,000
Texas	3,000	11,286	49,414	63,700	8,355,000
Utah	4,200	5,647	6,403	16,250	121,000
Vermont	4,000	38,833	39,281	82,114	2,465,000
Virginia	3,000	57,160	133,635	193,795	23,636,000
Washington	3,000	35,616	121,938	160,554	6,850,000
West Virginia	7,683	24,130	59,567	91,380	4,037,000
Wisconsin	4,000	161,062	327,885	492,947	27,851,000
Wyoming	2,707	2,707	6,877	12,291	170,000
Total	233,987	2,707,987	3,600,969	6,542,943	587,647,000

TABLE 12.—*Planting stock available for forest and windbarrier planting on State and private lands, area planted or seeded, and acreage in need of planting*

State and Commonwealth	Planting stock shipped, fiscal year 1963			Area planted or seeded, fiscal year 1963 [1]	Plantable area as of January 1, 1953 [2]	Planting needs 1958 [3]
	State nurseries	Other	Total			
	Thousands	*Thousands*	*Thousands*	*Acres*	*Acres*	*Acres*
Alabama	48, 292	13, 700	61, 992	77, 282	1, 675, 000	5, 006, 000
Alaska	0	0	0	0	----------	----------
Arizona	0	0	0	37	18, 000	40, 000
Arkansas	8, 869	0	8, 869	66, 329	1, 408, 000	1, 405, 000
California	3, 346	1, 027	4, 373	35, 072	3, 357, 000	3, 001, 000
Colorado	352	11	363	1, 225	295, 000	318, 000
Connecticut	1, 792	35	1, 827	1, 314	205, 000	111, 000
Delaware	813	0	813	798	34, 000	11, 000
Florida	67, 114	16, 992	84, 106	133, 547	4, 859, 000	7, 033, 000
Georgia	48, 363	57, 212	105, 575	123, 458	1, 566, 000	6, 344, 000
Hawaii	1, 241	0	1, 241	3, 816	----------	810, 000
Idaho	438	0	438	982	265, 000	691, 000
Illinois	4, 759	0	4, 759	4, 679	2, 856, 000	904, 000
Indiana	3, 992	0	3, 992	4, 370	1, 290, 000	330, 000
Iowa	1, 420	378	1, 798	1, 779	613, 000	264, 000
Kansas	0	1, 500	1, 500	2, 023	915, 000	230, 000
Kentucky	12, 175	1, 200	13, 375	19, 009	1, 500, 000	2, 004, 000
Louisiana	30, 039	7, 778	37, 817	66, 631	1, 139, 000	2, 379, 000
Maine	4, 014	600	4, 614	3, 678	472, 000	1, 171, 000
Maryland	5, 578	0	5, 578	4, 891	250, 000	455, 000
Massachusetts	561	0	561	961	114, 000	254, 000
Michigan	16, 103	23, 274	39, 377	18, 395	2, 905, 000	1, 424, 000
Minnesota	35, 048	2, 867	37, 915	37, 776	2, 410, 000	5, 427, 000
Mississippi	44, 484	0	44, 484	75, 604	4, 187, 000	2, 255, 000
Missouri	5, 993	13	6, 006	6, 255	1, 267, 000	3, 200, 000
Montana	1, 060	664	1, 724	3, 350	214, 000	931, 000
Nebraska	0	3, 238	3, 238	6, 607	968, 000	87, 000
Nevada	36	0	36	91	28, 000	30, 000
New Hampshire	1, 239	0	1, 239	1, 239	309, 000	464, 000
New Jersey	624	140	764	651	93, 000	819, 000
New Mexico	0	0	0	2, 446	97, 000	245, 000
New York	22, 143	527	22, 670	22, 147	1, 250, 000	1, 378, 000
North Carolina	40, 658	12, 000	52, 658	49, 989	898, 000	2, 841, 000
North Dakota	1, 484	8, 340	9, 824	10, 566	742, 000	231, 000
Ohio	14, 715	2, 171	16, 886	13, 386	729, 000	616, 000
Oklahoma	1, 892	0	1, 892	9, 288	876, 000	1, 054, 000
Oregon	20, 425	174	20, 599	69, 172	969, 000	2, 008, 000
Pennsylvania	14, 662	28, 533	43, 195	40, 900	1, 080, 000	869, 000
Puerto Rico	1, 304	0	1, 304	1, 734	----------	105, 000
Rhode Island	0	0	0	28J	39, 000	85, 000
South Carolina	56, 191	2, 812	59, 003	64, 574	1, 169, 000	2, 269, 000
South Dakota	479	2, 700	3, 179	8, 738	702, 000	129, 000
Tennessee	25, 722	18, 219	43, 941	31, 664	1, 465, 000	1, 181, 000
Texas	8, 332	17, 282	25, 621	31, 222	539, 000	2, 235, 000
Utah	75	0	75	240	37, 000	46, 000
Vermont	2, 465	0	2, 465	2, 530	99, 000	274, 000
Virginia	16, 558	13, 000	29, 558	46, 658	1, 799, 000	880, 000
Washington	9, 280	8, 978	18, 258	22, 638	751, 000	1, 136, 000
West Virginia	5, 264	0	5, 264	4, 150	989, 000	567, 000
Wisconsin	28, 860	4, 285	33, 145	35, 640	2, 685, 000	5, 172, 000
Wyoming	0	0	0	485	95, 000	103, 000
Total	618, 254	249, 650	867, 911	1, 170, 297	52, 222, 000	70, 822, 000

[1] Includes 157,444 acres directly seeded, primarily in Alabama, Florida, Louisiana, Oregon, and Washington.

[2] Figures are those reported in "Timber Resources for America's Future." Alaska, Hawaii, and Puerto Rico were not included in the timber resource study.

[3] As reported in the National Inventory of Soil and Water Conservation Needs, 1962.

TABLE 13.—*Cooperative forest management accomplishments and expenditures, fiscal year 1963*

(U.S. Forest Service and State Foresters cooperating in 590 projects)

State and Commonwealth	Accomplishments				Expenditures		
	Woodland owners assisted	Woodland involved	Products harvested	Gross sale value	Federal	State	Total
	Number	*Acres*	*M bd. ft.*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	643	76,251	6,524	147,685	41,600	45,650	87,250
Alaska	7	640	2,000	0	15,300	15,300	30,600
Arkansas	917	70,693	1,570	36,345	43,200	44,268	87,468
California	1,960	335,833	59,821	1,077,109	39,900	72,282	112,182
Colorado	309	34,219	675	15,358	19,996	36,595	56,591
Connecticut	1,511	25,483	2,310	42,369	25,800	30,850	56,650
Delaware	73	2,346	1,763	56,300	4,500	5,141	9,641
Florida	4,168	1,764,576	34,828	837,368	101,600	158,806	260,406
Georgia	8,744	686,308	18,024	351,019	97,000	135,191	232,191
Idaho	336	40,313	171	650	16,000	18,739	34,739
Illinois	1,783	37,502	4,031	158,660	52,700	88,727	141,427
Indiana	1,181	40,231	3,522	129,517	26,468	26,468	52,936
Iowa	1,449	15,227	669	56,688	20,300	49,371	69,671
Kansas	412	9,132	197	11,225	18,450	18,450	36,900
Kentucky	3,845	74,978	8,764	273,853	77,200	118,822	196,022
Louisiana	290	30,103	3,734	72,430	36,500	38,635	75,135
Maine	1,446	59,398	17,078	258,549	61,900	100,462	162,362
Maryland	1,507	25,716	7,293	214,200	45,000	80,886	125,886
Massachusetts	2,970	57,908	29,554	417,904	23,350	37,088	60,438
Michigan	2,394	68,791	10,782	273,839	75,600	111,146	186,746
Minnesota	4,189	40,286	5,659	198,857	42,100	60,595	102,695
Mississippi	1,131	116,931	2,088	41,567	43,800	84,461	128,261
Missouri	1,661	194,456	13,447	300,501	76,600	107,086	183,686
Montana	306	34,741	399	12,116	15,511	15,511	31,022
Nebraska	484	14,277	273	23,567	15,100	15,163	30,263
Nevada	167	2,123	0	0	10,000	10,339	20,339
New Hampshire	2,684	98,735	8,473	186,479	34,163	47,846	82,009
New Jersey	860	23,508	3,328	79,622	29,450	46,917	76,367
New Mexico	97	45,454	23,897	231,190	20,000	26,147	46,147
New York	5,996	189,939	24,233	794,669	139,458	139,458	278,916
North Carolina	7,695	169,939	35,802	800,224	88,300	240,607	328,907
North Dakota	156	3,627	106	4,434	20,000	22,555	42,555
Ohio	2,635	58,072	6,838	230,735	78,000	78,373	156,373
Oklahoma	304	34,394	325	2,680	11,865	11,884	23,749
Oregon	4,047	115,303	9,226	310,178	40,965	40,965	81,930
Pennsylvania	2,277	50,714	7,772	180,500	91,000	110,575	201,575
Rhode Island	333	11,521	1,559	5,282	7,434	7,538	14,972
South Carolina	3,501	263,884	13,569	411,606	62,300	116,622	178,922
South Dakota	248	34,205	4,733	22,150	20,000	25,464	45,464
Tennessee	1,584	122,608	8,208	317,364	50,500	80,461	130,961
Texas	539	62,630	708	6,964	35,800	40,595	76,395
Utah	67	1,682	260	2,510	7,306	8,909	16,215
Vermont	3,369	51,669	12,149	375,773	56,600	88,482	145,082
Virginia	4,880	240,927	147,496	3,391,236	140,000	218,072	358,072
Washington	2,670	96,299	22,385	678,381	47,900	49,705	97,605
West Virginia	2,962	59,722	3,058	69,184	52,900	89,885	142,785
Wisconsin	8,187	167,799	18,725	633,712	157,200	285,198	442,398
Wyoming	0	0	0	1	2,905	2,905	5,810
Total, U.S.	98,974	5,761,093	588,026	13,742,550	2,239,521	3,305,195	5,544,716
Puerto Rico	2,849	915	20	973	15,000	17,095	32,095
Grand total	101,823	5,762,008	588,046	13,743,523	2,254,521	3,322,290	5,576,811

TABLE 14.—*Pest control accomplishment and costs, calendar year 1963*

OAK WILT CONTROL ACCOMPLISHMENTS

Ownership or management	Area surveyed	Trees treated	Funds expended		
			Federal	State	Total
	Thousand acres	*Number*	*Dollars*	*Dollars*	*Dollars*
National Forest:					
Cumberland	132	0	349	----------	349
Jefferson	543	1	672	----------	672
George Washington	896	82	2,109	----------	2,109
Ozark	1,000	0	841	----------	841
Monongahela	800	30	915	----------	915
Subtotal	3,371	113	4,886	----------	4,886
State and Private:					
Arkansas	8,000	395	2,203	4,543	6,746
Kentucky	10,376	0	11,800	36,024	47,824
North Carolina	1,324	122	2,043	4,086	6,129
Pennsylvania	8,120	1,121	15,374	46,123	61,497
Virginia	3,884	166	1,856	5,570	7,426
West Virginia	9,800	3,937	30,855	102,401	133,256
Subtotal	41,504	5,741	64,131	198,747	262,878
Grand total	44,875	5,854	69,017	198,747	267,764

BLISTER RUST CONTROL

Ownership or management	Control by ribes eradication						Control with antibiotics		
	Premaintenance work		Maintenance work		Ribes eradicated	Control established	Surveyed[2]	Acres treated	Trees treated
	Surveyed[1]	Treated	Surveyed[1]	Treated					
	Acres	*Acres*	*Acres*	*Acres*	*Number*	*Acres*	*Acres*	*Acres*	*Number*
Federal:									
USDA, Forest Service	98, 971	30, 014	103, 159	7, 040	4, 179, 000	12, 412	282, 236	105, 920	16, 169, 165
Department of the Interior:									
National Parks	88, 737	14, 527	21, 771	3, 127	519, 000	18, 546	1, 230	3, 790	362, 000
Bureau of Land Management	9, 139	1, 491	5, 492	100	77, 000	1, 009	--------	--------	----------
Indian Reservations	3, 798	188	9, 110	1, 400	61, 000	168	--------	--------	----------
Subtotal, USDI	101, 674	16, 206	36, 373	4, 627	657, 000	19, 723	1, 230	3, 790	362, 000
Total Federal	200, 645	46, 220	139, 532	11, 667	4, 836, 000	32, 135	283, 466	109, 710	16, 531, 165
Non-Federal	503, 830	105, 719	1, 796, 012	70, 410	3, 541, 000	173, 308	78, 910	7, 880	965, 190
Grand total	704, 475	151, 939	1, 935, 544	82, 077	8, 377, 000	205, 443	362, 376	117, 590	17, 496, 355

[1] Systematically inspected to locate area in need of treatment and to determine effectiveness of control.
[2] Inspected to determine where antibiotic treatment is feasible and where cost-benefit ratios are favorable.

TABLE 14.—*Pest control accomplishment and costs, calendar year 1963*—Continued

INSECTS

Ownership or management	Bark beetles		Defoliators		Other insects			Costs for all insects [4]
	Trees [3] treated	Control costs	Area treated	Control costs	Area treated	Trees treated	Control costs	
	Number	*Dollars*	*Acres*	*Dollars*	*Acres*	*Number*	*Dollars*	*Dollars*
National Forest	1,141,991	3,285,861	1,168,532	1,429,597	4,773	5,796	34,282	[5] 4,749,740
State and Private	668,236	789,501	545,216	546,394	1,042	151,127	17,559	1,353,454
Total	1,810,227	4,075,362	1,713,748	1,975,991	5,815	156,923	51,841	6,103,194

[3] Includes infested trees, stumps, and cull logs.
[4] Exclusive of administrative and survey expenditures.
[5] Includes the Federal share of control costs on non-Federal lands.

TABLE 15.—*Statement of Forest Service receipts and expenditures, all programs and sources, fiscal year 1963*

Item	Receipts	Expenditures
	Dollars	*Dollars*
National Forest programs:		
Cash receipts and appropriation expenditures	155, 919, 251	274, 980, 888
Cash receipts from National Forest land collected by and deposited to accounts of other agencies (Federal Power Commission, Department of Interior)	11, 671, 160	
Noncash income and expense (roads built by timber purchasers)	54, 478, 018	54, 478, 018
Total	222, 068, 429	329, 458, 906
Forest research programs:		
Forest research appropriations		23, 748, 988
Cooperative research work	955, 396	972, 056
Total	955, 396	24, 721, 044
State and private forestry programs:		
Fire protection, tree distribution, and forest management cooperation		15, 849, 851
Soil bank program		−25, 603
Assistance to States for tree planting		992, 121
Great Plains conservation program		17, 469
Insect and disease control		2, 156, 906
Flood prevention and watershed protection		1, 967, 685
Forest fire prevention, "Smokey Bear"	27, 643	12, 543
Cooperator funds	1, 922, 942	2, 010, 534
Total	1, 950, 585	22, 981, 506
Work for other Government agencies and non-Government persons and firms:		
Insect and disease control (Interior Department lands)		148, 858
Miscellaneous work for other Government agencies	3, 094, 539	4, 462, 121
Work performed for non-Government persons, firms, etc.—cooperative work	3, 329, 569	2, 903, 802
Reimbursed	861, 902	861, 902
Total	7, 286, 010	8, 376, 683
Total receipts and expenditures	232, 260, 420	385, 538, 139
Cash receipts distributed to States, counties, and Puerto Rico as directed by Congress (receipts of F.Y. 1962 except as indicated):		
Payments to States and Puerto Rico (Act 5/23/08) National Forest fund		[1] 27, 235, 140
Payments to school funds, Arizona and New Mexico (Act 6/20/10) National Forest fund		80, 462
Payment to Minnesota (Cook, Lake, and St. Louis Counties) (Superior N.F.) (Act of 6/22/48) National Forest fund		125, 432
Payment to counties—National Grasslands and land utilization areas (Act 7/22/37) (Receipts of C.Y. 1962)		389, 506
Total		27, 830, 540
Internal equipment and supply services (working capital fund):		
Financed primarily by charges included above to Forest Service programs	25, 265, 404	24, 614, 171

[1] Does not include approximately $2,661,607 due counties from F.Y. 1962 receipts on National Forest O&C lands. This amount was included in total receipts of $3,548,809 transferred to Interior for distribution under act of August 28, 1937 (50 Stat. 874), as amended.

NOTE: Expenditures are on an obligation basis except Working Capital Fund, which is on an accrual basis.

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